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ESSAYS ON EMPIRICAL ASSET PRICING

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ESSAYS ON EMPIRICAL ASSET PRICING

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Dedication

To my family

for their unconditional love and support

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ESSAYS ON EMPIRICAL ASSET PRICING

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The University of Texas at Austin, 2011

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This dissertation contains two essays that use empirical techniques to shed light on open questions in the asset pricing literature. In the first essay, I investigate whether foreign institutional investors affect stock liquidity in domestic equity markets. The evidence indicates that stocks with higher foreign institutional ownership subsequently experience higher liquidity. However, it is difficult to interpret the causal relation of this finding because institutional investors self-select into more liquid stocks. To solve this problem, I exploit a provision in the 2003 US dividend tax cut which extends tax-relief to dividends from US tax-treaty countries but not to dividends from non-treaty countries. This natural experiment suggests a causal link between foreign institutional investors and liquidity. Consistent with the predictions of theoretical models, I find that liquidity improves due to foreign institutional investors increasing information competition.

In the second essay, I introduce a new measure of difference of opinion using mutual fund portfolio weights to test prominent competing theories of the effect of heterogeneous beliefs on asset prices. The over-valuation theory (Miller (1977)) proposes that in the presence of short-sale constraints stock prices reflects only the view of optimistic investors which implies lower subsequent returns. Alternatively, neo-classical asset pricing models (Williams (1977), Merton (1987)) suggest that differences of opinions indicate high levels of information uncertainty or risk which implies higher

expected returns. My initial result finds no support for the over-valuation theory. Instead, the measure used in this study finds that high differences of opinion stocks weakly outperform low differences of opinion stocks by 2.42% annually which is more consistent with the information uncertainty explanation.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

In this dissertation, I study two open questions in the asset pricing literature using empirical techniques. In Chapter 2, I tackle the question of whether foreign investors affect liquidity in the domestic stock market. This is an important issue because liquidity is an essential attribute of any financial market. A popular perception is that foreign investors may destabilize markets. In the aftermath of the 2008 financial crisis, regulators and policy makers set capital controls on foreign investment due to concerns that foreign investors may harm market quality.[1]

I find that foreign institutional investors improve liquidity in domestic equity markets. This implies that foreign participation may be beneficial to the quality of the domestic markets. However, it is difficult to draw causal inferences about this relation because foreign investors are primarily institutional investors who are known to self-select into liquid stocks. For researchers, this creates an identification problem. To disentangle the direction of causation between institutional investors and liquidity, I use a difference-in-difference approach that exploits a provision in the 2003 United States dividend tax cut. This provision extends the US dividend tax cut (15%) to international dividends but only if the dividends are from companies located in countries that have an existing tax treaty with the United States. This creates an incentive for US tax-sensitive institutional investors to reallocate their portfolios towards dividend-paying stocks domiciled in tax-treaty countries but not towards stocks in non-tax treaty countries. This

[1] The World Bank and the IMF (2010) have advised international regulators to utilize capital controls to curb speculative 'hot money' inflows ("World Bank says Asia may need capital controls", Bloomberg News, Nov. 8, 2010). Brazil, China, Hong Kong, Taiwan and Thailand recently implemented policies targeted at regulating foreign capital flows ("Hot money may overheat emerging markets," USA Today, Nov. 18, 2010). Financial regulators of developed exchanges, notably Jean-Claude Trichet, ex-governor of the Banque de France, have previously expressed similar concerns (Trichet (2001)).

reallocation creates an exogenous shock in foreign institutional investor holdings that is likely unrelated to the liquidity of the stock. This natural experiment helps to separate the confounding effects of self-selection and causality. The findings suggest that the relationship between foreign institutional investors and stock liquidity is indeed causal.

This first essay makes several contributions to the growing literature on the impact of financial integration.[2] First, I provide new evidence of a causal link between foreign institutional investors and domestic stock liquidity. Highlighting this facet of international capital flows may be useful for regulators and international policymakers when considering foreign capital restrictions. Second, unlike previous studies that focus on market liberalization periods when markets first opened to foreign investment, this study shows that the benefits of foreign investors can continue to accrue post-liberalization. Third, I show that liquidity improves not only in emerging markets but that developed markets can also benefit from foreign institutional capital flow.

In Chapter 3, I address the open debate surrounding the relationship between differences of opinion and asset prices. A defining characteristic of financial markets is that agents often hold different opinions even when they possess common information. Recent theoretical models that include heterogeneous beliefs have made promising developments that shed light on the behavior of asset prices. Yet, empirically it has proved difficult to find reliable proxies for differences of opinions amongst investors.

I bridge this gap in the literature by introducing a new measure of differences of opinion based on the portfolio holdings of mutual fund managers. The beliefs of mutual fund managers can be elicited by observing how they deviate their portfolios from their

[2] Bekaert, Harvey and Lundblad (2005, 2009) and Henry (2000a) find improvements in economic growth, investment opportunities and productivity from market integration. Stulz (1999), Henry (2000b), Errunza and Miller (2000) and Bekaert and Harvey (2000) find a decrease in the cost of capital after market liberalization.

benchmark portfolio weights. By combining these deviations, I create a measure of differences of opinion based on mutual fund manager disagreement. This new measure is used test prominent competing theories of the effect of heterogeneous beliefs on asset prices.

There are three general classes of heterogeneous belief models that offer testable empirical implications. First, Miller (1977) argues that in the presence of short-sale constraints, stock price reflects only the view of optimistic investors. This 'over-valuation' theory implies that stocks with high differences of opinion would experience lower subsequent returns. Second, Diamond and Verrecchia (1987) and Hong and Stein (2003) propose that the existence of rational arbitrageurs or market makers that are able to short sell would eliminate this mis-pricing. Prices would remain unbiased and differences of opinion would not be related to future returns. A third theory first proposed in Williams (1977) suggests that differences of opinions likely indicate information uncertainty or parameter risk which implies higher expected returns.

Using the mutual fund manager disagreement measure, my initial result finds no support for the over-valuation theory. Instead, the measure used in this study finds that high differences of opinion stocks weakly outperform low differences of opinion stocks by 2.42% annually which is more consistent with the information uncertainty explanation.

Chapter 2: Do Foreign Investors Improve Stock Liquidity? Evidence from Institutional Holdings

2.1 INTRODUCTION

Do foreign investors affect stock liquidity in the domestic market? This is an important question in light of the recent policy debate on the destabilizing effects of foreign investors. The World Bank and the IMF (2010) have advised international regulators to utilize capital controls to curb speculative 'hot money' inflows.[3] Despite the vital importance of this issue, there is little comprehensive evidence on the relationship between foreign investors and domestic stock liquidity.[4] Foreign capital flows originate predominantly from financial institutions whose trading behavior could hamper liquidity by overwhelming market maker inventories.[5] On the other hand, there are plausible reasons to believe that foreign institutional investors may improve liquidity. For example, they may increase uninformed order flow ('noise' trading), lower information asymmetries or use sophisticated trading systems that are optimized to mitigate market impact.[6]

In this study, I find that foreign institutional investors improve liquidity in domestic equity markets. While it is straightforward to establish a correlation between

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[3] ("World Bank says Asia may need capital controls", Bloomberg News, Nov. 8, 2010). Brazil, China, Hong Kong, Taiwan and Thailand recently implemented policies targeted at regulating foreign capital flows ("Hot money may overheat emerging markets," USA Today, Nov. 18, 2010). Financial regulators of developed exchanges, notably Jean-Claude Trichet, ex-governor of the Banque de France, have previously expressed similar concerns (Trichet (2001)).

[4] Prior research on financial globalization and liquidity has either concentrated on country-level liquidity (Bekaert and Harvey (2002)) or has focused in a particular country (Rhee and Wang (2009)).

[5] Institutions tend to execute larger orders (Kraus and Stoll (1972), herd into stocks and industries (Lakonishok et al (1992), Sias (1997), Grinblatt, Titman, and Wermers (1995), Wermers (1999), Choi and Sias (2010)), and destabilize prices (Dasgupta, Prat and Verardo (2010)). Cross-border portfolio flows are also known to display trend-chasing behavior (Griffin, Nardari and Stulz (2004) and Froot and Ramadorai (2008)).

[6] Studies in U.S. domestic market find that the increase in algorithmic trading systems has improved liquidity (Hendershott, Jones, and Menkveld (2010)). Other studies find that hedge funds tend to be liquidity providers in the U.S. market (Aragon and Strahan (2010), Ajylha, Rinne, and Suominen (2011)).

foreign institutional investors and liquidity, it is challenging to show a causal relation because institutions may prefer to hold more liquid stocks.[7] For researchers, this creates an identification problem. Prior studies on the impact of institutional investors on stock liquidity rely on cross-sectional variation in institutional participation or Granger causality tests for identification.[8] The temporal nature of these tests alleviates some of the concern that institutions self-select into more liquid stocks but leaves open the lingering possibility of an omitted variable that determines both current institutional ownership and future stock liquidity. For example, institutional investors have an incentive to search for stocks with high liquidity in the future in the event that they need to liquidate their position. If such omitted variables exist, the endogeneity problem remains unresolved.

To disentangle the direction of causation between institutional investors and liquidity, I use a difference-in-difference approach that exploits a provision in the 2003 United States dividend tax cut. Specifically, this provision extends the US dividend tax cut (15%) internationally but only to a subset of dividends from companies located in certain foreign countries that had an existing tax treaty with the United States. Desai and Dharmapala (2010) find that this created an incentive for US capital to reallocate towards dividend-paying stocks domiciled in tax-treaty countries but not towards stocks in non-tax treaty countries. Using this natural experiment, I find that liquidity improved more in dividend-paying stocks of treaty countries compared to non-treaty countries, suggesting that the relationship between foreign institutional investors and stock liquidity is causal.

My empirical approach uses a 10 year panel (2000 to 2009) of foreign institutional investor stock holdings from the Factset/Lionshares database to examine

[7] Institutions seek to minimize trading costs and the price impact of their trades. Gompers and Metrick (2001) find that institutions exhibit a preference for liquidity.

[8] For US studies see Agarwal (2007) and Liu (2008). Aragon and Strahan (2009) use the bankruptcy of Lehman Brothers as an exogenous shock to funding costs to show that hedge funds act as liquidity providers.

liquidity across 21 developed and 13 emerging countries.[9] The comprehensive stock level nature of this database affords more powerful tests because it captures within country variation in both foreign institutional ownership and liquidity. I show that stocks with increased participation by foreign institutional investors subsequently experience higher liquidity as measured using Amihud's (2002) price impact measure (ILLIQ).[10] The effect is incremental to the presence of domestic institutions and exists in both developed and emerging markets. Under various econometric specifications, a one percent increase in foreign institutional share ownership creates a 1.4 to 3 percent reduction in price impact.

There are various channels through which foreign institutional investors may affect liquidity. They make invest on behalf of their clients for risk-sharing and portfolio diversification benefits. In this instance, they act as traditional noise-traders, providing liquidity to markets through their hedge trading. Foreign investment also tends to attract heightened scrutiny and media coverage. This may create an 'attention effect' by attracting additional noise traders to the stock (Merton (1987)). Alternatively, liquidity may improve through increased information competition amongst informed agents. The 'information competition' hypothesis predicts that if foreign institutions are informed,[11]

[9] The data are collected from country regulatory filings or directly from the exchanges. The holdings in this database represent nearly 40% of the world stock market capitalization (Ferreira and Matos (2008) and Ferreira, Matos and Pereira (2009)).

[10] ILLIQ is a popular and relatively accurate measure of the price impact component of liquidity when estimated over longer time horizons (Goyenko, Holden and Trzcinka (2009)). I find similar results using the following measures: LOT transactions cost measure in Lesmond, Ogden, Trzcinka (1999), percentage of zero trading days in Bekaert, Harvey and Lundblad (2007), and the high-low price spread measure created in Corwin and Schultz (2010).

[11] Financial institutions are generally regarded as informed/sophisticated traders. But the question of whether foreign investors have informational advantages remains an open debate. Grinblatt and Keloharju (2000), Seasholes (2004), Froot and Ramadorai (2008) find that foreign investor appear to be informed on their trades. Choe, Kho, Stulz (2005), Kang and Stulz (1997), and Hau (2001) find evidence in Korea, Japan and Germany that foreign investors tend to lose out on their trades. In a study of the data used in this study, foreign-based money managers are found to outperform local-based money managers (Ferreira, Matos and Pereira (2009)).

their entry into new markets may increase the competition over trading profits with existing informed traders. In Kyle (1985), informed agents optimally withhold information which can result in lower levels of liquidity. The arrival of new informed agents can spur a competitive equilibrium where information is more quickly impounded into prices leading to better informational efficiency and higher liquidity (Subrahmanyam (1991a), Foster and Viswanathan (1996)).[12]

I test the information competition channel from two directions. First, I use a variety of measures found in prior studies that proxy for informed trading by institutional investors (geographical proximity, sophistication, and institution type). The results indicate that the positive effect of foreign institutional investors on stock market liquidity originates primarily from institutions that are likely to be informed. Second, I examine the marginal effect of foreign institutional investors on stock liquidity across different information environments. These results also support the information competition channel. Specifically, foreign institutional investors generate greater improvements in liquidity in opaque information environments where the prevalence of informed traders is likely to be greater.

This study makes several key contributions to the growing literature on financial integration.[13] First, I provide new evidence of a causal link between foreign institutional investors and domestic stock liquidity. Highlighting this benefit of international capital flows may be useful for regulators and international policymakers when setting capital controls and restrictions on foreign investors. Second, unlike previous studies that focus

[12] Foreign institutions may also appear informed by engaging in more sophisticated liquidity provision strategies. Mutual funds have been shown to capture liquidity premiums by providing liquidity to impatient traders (Da, Gao, Jagannathan (2010), Zhang (2010)).

[13] Bekaert, Harvey and Lundblad (2005, 2009) and Henry (2000a) find improvements in economic growth, investment opportunities and productivity from market integration. Stulz (1999), Henry (2000b), Errunza and Miller (2000) and Bekaert and Harvey (2000) find a decrease in the cost of capital after market liberalization.

on market liberalization periods when markets were first opened to foreign investment, this study shows that the benefits of foreign investors can continue to accrue post-liberalization. Third, I show that liquidity improves not only in emerging markets but that developed markets can also benefit from foreign institutional capital flow.

2.2 DATA DESCRIPTION AND SUMMARY STATISTICS

2.2.1 Sample Construction

Foreign institutional holdings are extracted from the FactSet / Lionshares database. The FactSet / Lionshares database compiles global institutional ownership data from national regulatory agencies, stock exchange announcements, local and offshore mutual funds, mutual fund industry directories and company proxies and annual reports. To date, the Lionshares database is the most comprehensive source of international institutional ownership (Ferreira and Matos (2008)). For example, Lionshares gathers holdings information for U.S. institutions from the SEC 13F filings which require all institutions with more than $100 million in equity holdings to report their holdings each quarter.

From the Lionshares database, I extract institutional share holdings (HOLDING) of ordinary equity at the end of each December from 2000 through 2009. If the institutional investor does not report in December, I follow prior literature and use the latest reported share holdings during that calendar year. I restrict the sample to those countries that have continuous reporting of stock returns and have a sizable amount of foreign institutional ownership (more than half a billion US$). While the database provides ample coverage of foreign institutions, it provides weaker coverage of domestic institutions especially in emerging countries. This is due to the fact that developed nations have more diligent reporting requirements for financial institutions and are the

primary source of foreign equity investment. For example, 60% of foreign ownership originates from the United States which has high data quality and strict reporting standards monitored by the Securities and Exchange Commission. Emerging countries typically have less diligent reporting requirements for their financial institutions. For the purposes of this study, I primarily focus on foreign institutions but I also examine a subset of countries with sufficient domestic institutional coverage.

The sample consists of all common equity from Datastream from 1999 through 2009 which includes stocks both on the Datastream dead and active lists. For all common equity, I extract available daily volume (VO), shares outstanding (NOSH), market value (MV), and return index (RI) data items. Since this study focuses on *local* stock liquidity, I omit cross listings, American depository receipts (ADRs) and Global depository receipts (GDRs) but keep the underlying security in the home country. The data are then filtered for outliers, data errors and misclassification following the methodology of Griffin, Kelly, and Nardari (2010).[14] An additional filter discards reported volume (VO) if volume is negative or the daily shares traded are greater than the daily shares outstanding (NOSH). Daily closing spot (WM/Reuters) exchange rates are obtained from Datastream for currency conversion purposes.

Annual firm level accounting and other financial data is collect from the Worldscope database including book value (WC03501), inside ownership (WC08051) and dividend yield (WC09404). To be included in the sample, a stock must have reported book value from the previous calendar year. Analyst coverage is obtained from the I/B/E/S database.

[14] The database has been kindly provided by the authors. The filtering process eliminates non-common equity such as mutual funds, investment trusts, and unit trusts. A comprehensive country specific filtering process removes additional securities such as preferred stocks, convertibles, and strips. Extreme and erroneous daily returns are set to missing. Refer to the appendix in Griffin, Kelly and Nardari (2010) for full details.

The final sample is a 10 year panel (2000-2009) with 111,208 firm-years and 27,918 total firms across 34 countries. Countries are categorized into geographical (Americas, Asia and Europe) and economic groupings based on the most recent Morgan Stanley Capital International (MSCI) classifications.[15] The sample includes a total of 34 countries with 21 developed markets (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Netherlands, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom) and 13 emerging markets (Chile, China, Hungary, India, Italy, Lithuania, Malaysia, Mexico, Philippines, Poland, South Korea, Taiwan, and Thailand).

2.2.2 Variable Definitions

The existing research on institutional investors in the United States provides useful guidelines for the construction of ownership variables in this study (Gompers and Metrick (2001), Bennett, Sias and Starks (2003)). First, institutions are categorized as foreign if the institution is located in a country different from the country where the security is listed. Conversely, institutions are defined as domestic institutions if the security is listed in the same country as the institution. Next, foreign (domestic) institutional ownership is measured as the total number of shares held divided by the number of shares outstanding by foreign (domestic) institutional investors reported in December at the end of the year (*FI_OWN, DI_OWN*). Third, institutional participation is measured as the total number of unique foreign (domestic) institutions holding a security in December at the end of the year (*FI_NUM, DI_NUM*).

[15] Country classifications are reported in the MSCI Global Investible Market Indices Methodology Book (May 2010). I use the MSCI classification since the MSCI international indices are the most widely used indices amongst institutional investors.

Table 2.1 presents a complete summary of the variable definitions and original data source. Market capitalization (*Mktcap)* is equal to the market value (Datastream item MV) converted to US dollars (US$) on the last trading day of the year. The stock return (*Ret*) is the total return of the stock including dividend payments over the course of the year. Stock volatility (*Vol*) is defined as logarithm of the standard deviation of daily stock return during the year. Stock turnover (*Turn*) is calculated as the summation of the daily shares traded, *VO*, divided by the daily total shares outstanding, *NOSH*, for each stock *i*, for each trading day, *d*, during the year, *y*, Turnover= $\frac{1}{d}\sum_{t=1}^{d}\frac{VO_t^i}{NOSH_t^i}$.

The market-to-book ratio (*MTBV*) is defined as the ratio of market capitalization to book equity at the end of the year. The number of stock analysts (*Analyst*) is the total number of analysts covering the stock in the IBES database during the year.

2.2.3 Liquidity Measures

Liquidity is a complex notion that is difficult to capture with a single empirical proxy. In this study, the primary measure of liquidity is the ILLIQ price impact measure developed in Amihud (2002). The ILLIQ measure is constructed by averaging a daily measure of price impact over the course of the year. For each day a stock trades, a daily ILLIQ measure is calculated by dividing the absolute change in the daily stock price by the total price volume during the day. The annual ILLIQ measure for stock *i* in year *y* is defined as:

$$\text{ILLIQ}_{i,y}=\frac{1}{d}\sum_{t=1}^{d}\frac{|R_t^i|}{P*VO_t^i}.$$

where *d* is the number of trading days in a year, $|R_t^i|$ is the daily return, P_t^i is the adjusted closing price and VO_t^i is the trading volume of stock *i* on trading day *d*. By measuring ILLIQ over the course of the year, the impact of outliers and data errors are minimized. A 'deep' market, where large trading volumes do not move prices, has lower

ILLIQ values while shallow, less-liquid market have higher ILLIQ values. Following standard literature, I trim the 1% extremes of the sample to eliminate outliers and calculate the natural logarithm of the ILLIQ measure. For the regression analysis, I calculate the natural log of the ILLIQ measure so that it is convenient to interpret the coefficient estimates of the explanatory variables in percentage terms.

Since the ILLIQ measure is calculated using local prices, it is not easily comparable across countries due to currency denomination. For a comparable cross-country measure, I create a US$ denominated measure, $\text{ILLIQ\$}_{i,y} = \frac{1}{d}\sum_{t=1}^{d} \frac{|R_t^i|}{P\$*VO_t^i}$, that converts trading volume from local currency to US dollars at the daily WM/Reuters closing spot rate following Chan, Hong and Subrahmanyam (2008).

The ILLIQ measure is an attractive measure of liquidity as it can be interpreted as the empirical analog of the Kyle lambda parameter. This makes analysis straightforward when interpreting empirical results in relation to theoretical predictions. Furthermore, the ILLIQ measure has been shown to effectively capture price impact over monthly and annual time horizons (Goyenko, Holden, and Trzcinka (2009)). A key drawback of the ILLIQ measure is the requirement of volume data which suffers from inconsistent coverage in international markets, particularly in emerging countries.

To resolve this difficulty, I supplement the analysis with additional liquidity measures that require only a time-series of daily price data. Daily price data tends to be more accurate and reliably reported in the Datastream database. Lesmond, Ogden, and Trzinkca (1999) and Bekaert, Harvey and Lundblad (2007) estimate liquidity measures based on the incidence of observed zero daily returns (Zeros). Bekaert, Harvey and Lundblad (2007) emphasize that this measure is especially practical in emerging countries due to the relatively poor quality of transactions data. These return-based estimates rely on the idea that the value of the information signal must exceed transaction

costs for market participants to execute a trade.[16] Hence, these measures are better geared at measuring transaction cost component of liquidity, although the correlations with the ILLIQ in this sample are still fairly high (0.68 for Zeros).

The Zeros measure proposed in Bekaert, Harvey and Lundblad (2007) is the ratio of the number of days with a zero return divided by the total number of stock trading days $\frac{\sum \#\text{ of 0 return days}}{\sum \#\text{ of total trading days}}$ during the calendar year. A similar measure proposed in Lesmond, Ogden, Trzinkca (1999), known as the LOT trading cost measure is calculated using maximum likelihood estimation described in Griffin, Kelly, and Nardari (2010). The results are similar using the LOT measure in place of the Zeroes measure and are available from the author.

2.2.4 Summary Statistics

Table 2.2 presents a summary of stock characteristics for each country. Panel A presents emerging countries and panel B presents developed countries. The values represent the annual means (equal weighted) of each variable from 2000-2009. In the average statistics, the emerging markets in this sample have higher liquidity than the developed markets which appears counter-intuitive. But further examination reveals that this is primarily driven by the China and Taiwan markets which are among the most liquid markets in the world. **Figure 2.1** presents a time-series plot of ILLIQ throughout the decade sorted for different region-development markets. It displays a general improvement in liquidity throughout the decade until the 2008-2009 financial crisis when liquidity spiked.

[16] These two measures are quite similar and differ mainly in their estimation procedure. Lesmond et al (1999) uses maximum likelihood estimation while Bekaert, Harvey and Lundblad (2007) use a proportion of zero trading days.

Compared to emerging markets, developed markets have higher average foreign institutional ownership (2.33% vs.1.34%) and participation (10.1 vs. 4.4 institutions). **Figure 2.2** plots a time-series of foreign institutional ownership by region-development. It shows a general trend of increasing foreign institutional ownership across all region-development markets during the past decade. In particular, there is very strong growth in foreign institutional ownership in European developed markets that is potentially due to introduction of the Euro currency facilitating integration of capital markets.

2.3 FOREIGN INSTITUTIONAL INVESTORS AND STOCK LIQUIDITY

This section presents the main empirical findings of whether foreign institutional ownership and participation in year *t* predicts stock liquidity in year *t+1*. The empirical tests are designed in four parts. First, I estimate pooled OLS panel regressions using firms in all 34 countries to identify the statistical and economic importance of foreign institutional share ownership (%) and participation (number of institutions) on stock liquidity. Second, I show that the results are similar using a first difference regression model that estimates changes in liquidity from year *t* to *t+1* on the changes in foreign institutional share ownership and participation from year *t* to *t+1*. Next, I validate that the results are consistent across emerging and developed markets, geographic sub-samples, ADR and non-ADR subsamples and for individual countries. Finally, I examine the dynamics of the impact of foreign institutional investors on liquidity over the past decade. It is increasingly important to understand the evolving role of foreign institutions as they become bigger players in international financial markets.

2.3.1 Panel Regression Analysis

The primary econometric framework is a pooled OLS panel regression model. The flexibility of panel framework allows for the inclusion of various fixed effects which

capture unobserved underlying factors that may impact liquidity. These unobservable factors could exist across various dimensions including time, country and firm. This is an important consideration given the international nature of this study and the structural differences across markets.

The baseline regression model includes two fixed effects: country-year fixed effect and firm fixed effect. The country-year fixed effect ($\gamma_{k,t}$) captures unobservable country related factors that affect all firms in a country during a given year. Given that there are episodic periods of large capital flows into a country, it is important to control for an overall level effect of foreign institutional ownership in a country during a particular year (i.e. Argentina 2001). The remaining within country variation allows for the identification of a cross-sectional relationship between foreign institutional ownership and liquidity. The firm fixed effect (φ_i) allows for identification from time-series variation. It parametrically models the average level of foreign institutional ownership and liquidity for each stock. A first difference estimator would provide similar identification and is estimated in the following section. An added benefit of including firm fixed effects is that it controls unobservable firm-specific factors that may drive both foreign institutional ownership and liquidity.

The dependent variable, Illiquidity_{t+1}, is measured in year t+1 while the explanatory variables are measured in year t. This framework empirically tests whether a firm that experiences higher levels of foreign institutional ownership subsequently experience higher future levels of liquidity. The baseline regression model is specified in equation (1).

$$Illiquidity_{i,t+1} = \alpha + \beta_1 \times FI\_Own_{i,t} + \sum_{j=2}^{9} \beta_j \times Z_{j,i,t} + \gamma_{k,t} + \phi_i + \varepsilon_{i,t} \qquad (1)$$

$Illiquidity_{i,t+1}$ for firm *i*, at time *t+1* is measured as either the ILLIQ price impact measure following Amihud (2002) or the Zeros trading cost measure. Both illiquidity measures are logarithmically transformed so that the coefficient estimates of the independent variables can be interpreted as a one unit change in X_t generates a β percent change in $Illiquidity_{t+1}$. The key explanatory variable FI_Own is measured as the total percentage of shares held by foreign institutional investors for stock *i*, at the December end of year *t*. There are a total of 7 additional firm level control variables, $Z_{j,i,t}$,. The list includes market capitalization (*Mktcap*), the square of market capitalization ($Mktcap^2$), stock return (*Ret*), stock volatility (*Vol*), market-to-book ratio (*MTBV*) and the number of stock analysts (*Analysts*).

To assess statistical significance, standard errors are clustered at the firm level following the methodology in Petersen (2009). Since country-year fixed effects parametrically models the correlation across stocks in a country during a given year, the remaining correlation structure is likely to be at the firm level through time. This clustering technique addresses the possibility that firm observations are likely correlated.

Table 2.3, column [1] reports the results from the baseline regression model in Equation 1. The estimated coefficient β_1 of FI_Own is negative (-0.031) and statistically significant. This finding implies that foreign institutional ownership at *t* predicts future increased liquidity at time *t+1*. The estimated coefficients are economically significant. Since the dependant variable ILLIQ is logarithmically transformed, the coefficient estimate can be interpreted that on average every percentage increase in share ownership by foreign institutional investors predicts a future decrease in ILLIQ of 3.1%.

The number of foreign institutional investors may affect stock liquidity. I estimate an additional regression specification presented in Equation (2) that includes the number of foreign institutions (*FI_Num*).

$$Illiquidity_{i,t+1} = \alpha + \beta_1 \times FI\_Own_{i,t} + \beta_2 \times FI\_Num_{i,t} + \sum_{j=3}^{10} \beta_j \times Z_{j,i,t} + \gamma_{k,t} + \phi_i + \varepsilon_{i,t} \quad (2)$$

Table 2.3, column [2] reports the results from regression Equation (2). The coefficient estimate β_2 of FI_Num is negative (-0.008) and statistically significant which indicates that number of foreign institutional investors is associated with higher future liquidity. The coefficient estimate β_1 (-0.018) of FI_Own remains negative and statistically significant. This suggests that both the share ownership and number of foreign institutional investors are associated with future increases in liquidity.

The results are robust to using the Zeros measure of liquidity. As discussed in the previous section, liquidity is particularly difficult to measure in an international setting given the issues with volume data. The results in column [3] in **Table 2.3** demonstrate that the coefficient estimate β_1 (-0.008) of FI_Own and β_2 (-0.001) of FI_Num remain negative and statistically significant using the Zeros measure as the dependant variable. The economic magnitudes using the Zeros measure are smaller compared to the ILLIQ measure. The results indicate that on average a percentage increase in share ownership by foreign institutional investors predicts a future decrease in Zeros of 0.8% compared to a future decrease in ILLIQ of 1.8% in specification [2].

A potential concern with the interpretation of these results is that foreign institutional ownership is just a proxy for domestic institutional ownership. In which case, the results would be capturing the liquidity effect driven by domestic institutional investors and not foreign institutional investors. I address this issue by estimating a specification that includes domestic institutional ownership in a subsample of countries where there is sizable amount of reporting of domestic institutional ownership (UK, Sweden, Poland, Norway, Germany, France, Finland and Denmark). To demonstrate the

incremental impact of foreign institutional ownership on liquidity, I first estimate a specification with only domestic institutional ownership, DI_Own, and then introduce foreign institutional ownership, FI_Own, back into the specification.

Specification [4] of **Table 2.3** shows that the coefficient estimate of DI_Own is negative (-0.014) and statistically significant which indicates that domestic institutional ownership predicts higher liquidity. This result is consistent with US studies that find that institutional ownership is associated with higher future liquidity (Liu (2008), Agarwal (2009)). Column [5] of **Table 2.3** includes foreign institutional ownership in the regression specification. The coefficient estimates on DI_Own (-0.012) and FI_Own (-0.020) are negative and statistically significant. Column [6] finds similar results using the full sample. These findings are consistent with the notion that foreign institutional ownership increases liquidity beyond the effect of domestic institutional ownership.

2.3.2 First Difference (Changes) Regressions

The firm fixed effects specification in the prior section estimates how variables change relative to their average level within a firm. The results indicate that relatively higher levels of foreign institutional ownership or participation predict higher future levels of liquidity. Alternatively, identifying the relationship between foreign institutions and liquidity can also be estimated by testing whether a recent *change* in foreign institutional ownership is related to a subsequent *change* in liquidity. To do this, I estimate a first difference regression model to ensure that the empirical findings with the firm fixed effects regression model are robust. I regress future changes in illiquidity (t+1) on changes in foreign institutional ownership and firm level characteristics (t). Since the first difference captures innovations in the variables, I omit firm fixed effects as

it would cloud the interpretation of the coefficient estimates. The regression model specification is presented in Equation (3):

$$\Delta Illiquidity_{i,t+1} = \alpha + \beta_1 \times \Delta FI\_Own_{i,t} + \beta_2 \times \Delta FI\_Num_{i,t} + \sum_{j=3}^{10} \beta_j \times \Delta Z_{j,i,t} + \gamma_{k,t} + \varepsilon_{i,t} \quad (3)$$

ΔIlliquidity$_{i,t+1}$ for firm *i*, at time *t+1* is measured as Illiquidity$_{i,t+1}$ – Illiquidity$_{i,t}$ where Illiquidity is either the logarithm of the ILLIQ price impact measure or the logarithm of the Zeros trading cost measure, ΔFI_Own (ΔFI_Num) is the change in FI_Own (FI_Num) defined as FI_Own$_{i,t}$ – FI_Own$_{i,t-1}$, (FI_Num$_{i,t}$ – FI_Num$_{i,t-1}$), and $\Delta Z_{j,i,t}$ is the change in the additional seven firm level control variables (*Mktcap, Mktcap*^{2}*, Ret, Turn, Vol, MTBV,* and *Analysts*) and $\gamma_{k,t}$ is country-year fixed effect.

Table 2.4 reports the estimated coefficients and t-statistics from the first difference estimator. The regression estimates present similar inferences as the fixed effect panel regression estimates in the previous section. The coefficient estimates on Δ FI_Own and Δ FI_Num are negative and statistically significant across the six regression specifications as detailed in the prior section. The results find that both changes in foreign institutional ownership, Δ FI_Own, and changes in the number of foreign institutional investors, Δ FI_Num, predict future changes in liquidity. These findings provide a complementary robustness check to the main results with an alternative econometric framework. They also offer a slightly different economic interpretation. Specifically, the results imply that in the cross-section, stocks that experience larger increases in the number and share ownership of foreign institutional investors relative to other stocks in the current year subsequently experience greater improvements in liquidity in the next year.

2.3.3 Subsample Analysis

The pooled analysis of 34 countries identifies a general result that foreign institutional ownership predicts future stock liquidity. While this documents an important general worldwide effect, it is possible that these results may be isolated to particular countries, geographic regions or amongst certain types of stocks. For example, there is the potential concern that the results may be isolated to stocks that have cross-listings through ADRs or GDRs. Cross-listed stocks tend to exhibit different characteristics than non cross-listed stocks and may have intrinsic differences that drive the prior findings.

I perform two additional tests to corroborate the evidence that foreign institutional investors improve liquidity. First, I estimate the baseline specification of Equation (1) across sub-samples classified by developed and emerging markets, ADR and non-ADR samples and three geographical regions (Asia, America, and Europe). The results of the subsample analysis are presented in **Table 2.5**. The coefficient estimates β_1 of FI_Own are consistently negative and statistically significant across developed and emerging markets, geographical regions and for ADR and non-ADR stocks.

Second, I repeat this analysis for each individual country. In this model, country-year fixed effects are replaced with year effects since the regressions are estimated separately for each country. The coefficient estimates β_1 of FI_Own are negative for 31 of the 34 countries and statistically significant at the 5% level for 20 of those countries. To conserve space and for ease of presentation, the coefficient estimates (β_1) for FI_Own for each country are plotted in **Figure 2.3**.

2.3.4 Time Variation in the Impact of Foreign Institutional Investors on Liquidity

How has the importance of foreign institutional investors on liquidity changed over time? In particular, how important was this relationship during the 2008-2009 financial crisis when market liquidity quickly evaporated across financial markets?

Illiquidity was a defining characteristic of the 2008-2009 financial crisis. During market downturns, financial assets tend to become illiquid. Hameed, Kang and Viswananthan (2010) document that liquidity dries up in NYSE stocks during negative market returns. Brennan, Chordia, Subrahmanyam and Tong (2010) find similar evidence that sell-side illiquidity exceeds buy-side illiquidity. Anand, Puckett, Irvine and Venkataraman (2011) find that institutions experienced increased trading costs during the crisis. Both studies document that this asymmetric effects is related to the funding market. **Figure 2.1** shows that illiquidity spiked across all geographical regions in 2008 to the liquidity levels of the early 2000's.

To address this question, I estimate ten annual (2000-2009) cross sectional regressions of the relationship between foreign institutional ownership and liquidity. The regression model is similar to the baseline regression presented in Equation 1 but omits firm fixed effects as there is only a single time period for each regression.

The regression model is presented below in Equation (4) and uses the same variables as defined in the previous regressions.

$$Illiq_{i,t+1} = \alpha + \beta_1 \times FI\_Own_{i,t} + \sum_{j=2}^{9} \beta_j \times Z_{j,i,t} + \gamma_{k,t} + \varepsilon_{i,t} \quad (4)$$

The results are plotted in **Figure 2.4**. The annual coefficient estimates on FI_Own exhibit a general downwards trend through the decade. During the later periods from 2007 to 2009, the coefficient estimates on FI_Own are more negative than any point during the decade. These results indicate the growing importance of the impact of foreign institutional investors on liquidity.

2.4 ENDOGENEITY

A central concern of this analysis is that the relationship between foreign institutional ownership and stock liquidity is endogenous. From a statistical perspective, the increasing trend in foreign institutional ownership and stock liquidity could generate a spurious relationship. From an economics perspective, financial institutions may self-select into liquid stocks because the redemption demands of their clients may force them to liquidate positions quickly exposing them to potentially costly price impact. Anecdotal evidence suggests that institutions conscientiously assess the costs of trading and the price impact of their trades. Gompers and Metrick (2001) find that institutions exhibit a preference for certain stock characteristics including stocks with high turnover.

To examine these alternative explanations, I propose three additional causality tests. First, I test whether recent improvements in stock liquidity predict subsequent foreign institutional ownership ($t+1$). The results (unreported) suggest that while institutions are attracted to stocks with higher *levels* of liquidity, recent *changes* in liquidity are not significant. This suggests that foreign institutions are not buying stocks for their recent liquidity improvements. For the second test, I propose that a potential omitted variable that is associated with both increases in foreign institutional ownership and liquidity improvement is future stock returns. Foreign institutions may possess information so their stock holdings exhibit higher future returns. Higher stock returns may attract the attention of additional uninformed investors which could increase liquidity trading (Grullon, Kanatas and Weston (2004)). To test this alternative explanation, I estimate previous regression specifications on a sub-sample split on stocks with positive and negative future stock returns. In unreported results, foreign institutional ownership predicts future liquidity for both stocks that experience higher or lower future stock returns.

2.4.1 2003 Dividend Tax Change

In the final test, I exploit the 2003 United States Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) to create a natural experiment. The 2003 JGTRRA tax cut includes a provision to lower dividend tax rates to a maximum of 15% starting in 2003.[17] The tax cut was also extended to dividends from 'qualified' foreign corporations domiciled in a subset of countries that have tax treaties with the United States. US investors can receive the entire benefit of this tax cut since foreign dividend tax withholdings are typically lower than 15%.[18] The un-qualified dividends from corporations from non-treaty countries remains taxed at the ordinary personal income tax rate (35% for the top income tax bracket after JGTRRA).

The 2003 US dividend tax cut provides a natural experiment because qualified stocks become relatively more attractive to US investors after the tax change. This generates an exogenous shock to foreign institutional ownership by US investors for qualified, dividend-paying foreign stocks but not for similar stocks located in non-treaty countries. The impact of portfolio reallocation by US investors can be economically significant given that US institutions comprise 60% of foreign capital in this sample. The JGTRRA tax cut is a viable instrument for this study under the condition that qualified dividend paying stocks exhibit a subsequent increase in US institutional ownership and that the tax change itself did not increase liquidity in these stocks. Given that US tax law changes are unlikely to change the liquidity of foreign stocks (independent from increasing foreign institutional ownership), it can be assumed that the later condition is satisfied.

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[17] More precisely, after JGTRRA, dividends would be taxed at the same rate as capital gains which would be taxed at a maximum of 15%.

[18] The US tax code allows for a direct tax credit for foreign withholdings of dividends.

Desai and Dharmapala (2010) perform an extensive analysis of the effects of the JGTRRA tax-cut on aggregate U.S. foreign portfolio investment and conclude that the treaty status was chosen for its relative simplicity and administrative feasibility. A potential concern with this experimental design might be that non-treaty countries are considerably different than tax-treaty countries, in which case non-tax treaty countries would make a poor control group. The non-treaty countries[19] include Hong Kong, Singapore and Taiwan which are both active trading partners with the United States and a significant destination for US equity capital.

To assess the validity of this instrument, I first test whether US tax sensitive institutions increased their holdings towards qualified dividend paying stock after the enactment of JGTRAA. If US institutional reallocation was minimal, the tax-cut would serve as a poor instrument. Sialm and Starks (2010) find that mutual funds primarily held by taxable investors tend to be more tax-efficient. This suggests that it would be likely that US mutual fund managers would be aware of the tax implications of JGTRAA.

I use a difference-in-difference framework to test the impact of the tax cut on US institutional holdings in qualified dividend stocks. Since the portfolio reallocation effects would only happen around the time of the tax law change, I only include the years 2002, 2003 and 2004. The dependant variable is the % share ownership of US mutual funds (*% US Tax*) which excludes other tax exempt institutions such as pension funds. The regression model is stated in Equation (5).

$$\%\ US\ Tax_{i,t} = \alpha + \beta_1 \times Qualified_{i,t} + \beta_2 \times Post\ 2002_{i,t} + \beta_3 \times Treatment_{i,t} + \sum_{j=2}^{9} \beta_j \times Z_{j,i,t} + \gamma_i + \varepsilon_{i,t} \quad (5)$$

[19] The entire list of non-treaty countries is: Argentina, Brazil, Chile, Colombia, Hong Kong, Jordan, Malaysia, Peru, Singapore, Sri Lanka, and Taiwan.

This difference-in-difference panel regression framework includes three additional dummy variables. A dummy variable is equal to 1 if the stock is located in a treaty country and pays a dividend (*Qualified*). A separate dummy is equal to 1 if the observation is after 2002 and zero otherwise (*Post 2002*). Finally, the *Treatment* dummy is the interaction between *Qualified* * *Post-Tax Cut* dummies and represents the group of firms that US investors are expected to reallocate their portfolio towards. I include firm level control variables ($Z_{j,i,t}$) from the previous regressions. The regressions include country-fixed effects (γ_i) and the standard errors are clustered at that country-year level.

Table 2.6 reports the results of this regression. Column [1] reports the three difference-in-difference dummy variables. First, the coefficient estimate β_1 on the *Qualified* dummy is not significant suggesting that unconditionally qualified dividend paying foreign corporations do not have higher US mutual fund ownership. Second, the coefficient estimate β_2 on the Post 2002 is positive (0.025) and statistically significant suggesting that after 2002, US tax sensitive institutions increased their holdings amongst all international stocks. Third, the main coefficient estimate of interest, β_3 is positive (0.029) and statistically significant suggesting that US institutions reallocated towards qualified dividend corporations after the 2003 dividend tax cut which is consistent with the evidence presented in Desai and Dharmapala (2010). This suggests that the JGTRAA is a viable instrument for foreign institutional ownership. As an alternative test, column [2] reports the results of the same regression, but replaces the dependant variable with share ownership by US pension funds. Since pension funds are unaffected by tax changes, their allocation decisions will not change due to the tax change. The coefficient estimates for β_1, β_2, β_3 are insignificant which confirms that US mutual funds likely reallocated towards dividend-paying stocks in tax-treaty countries due to the preferred tax treatment initiated from JGTRAA. Together these results confirm the evidence in Desai

and Dharmapala (2010) that the 2003 dividend tax cut created a positive shock in US institutional ownership in qualified dividend paying stocks.

Next, I test whether these qualified dividend paying stocks experience a subsequent improvement in liquidity. I estimate a difference-in-difference panel regression following Equation (5) but I replaced %US Tax with measures of liquidity where liquidity is either the logarithm of the ILLIQ price impact measure or the Zeros trading cost measure. The results are reported in columns [4] and [5]. The findings indicate that the main coefficient estimate of interest, β_3 is negative and statistically significant for both measures of liquidity. The interpretation of this result is that liquidity improved more for qualified dividend corporations after the 2003 dividend tax cut. Taken together, these results are consistent with foreign institutions improving liquidity rather than self-selecting into liquid stocks.

2.5 INFORMATION COMPETITION AND LIQUIDITY

The information competition channel hypothesis proposes that liquidity may improve though the competition effects of informed traders. Subrahmanyam (1991) and Foster and Viswanathan (1996) solve an equilibrium where additional informed traders compete away the profits of withholding information which lowers information asymmetry and improves liquidity. A convincing argument for this liquidity channel would require isolating situations where foreign institutional investors are plausibly informed. Since it is notoriously difficult to observe information, I rely on existing evidence that documents circumstances where certain types of institutional investors demonstrate informational advantages.

I design four empirical tests that isolate plausible sources of informed trading. First, I separate foreign institutional investors into groups based on investor

sophistication. It is likely that more sophisticated institutions are more skilled traders and are more likely to possess valuable information. Although it is difficult to directly observe sophistication, previous studies find that the patterns of equity capital flows originating from the United States are consistent with US investors being informed (Froot and Ramadorai (2008), Albuquerque, Bauer and Schneider (2009)). To proxy for sophistication, I determine whether the institution originates from an emerging or developed market. While this is an admittedly simple method of categorizing institutions, I hypothesize that institutions originating from developed markets are likely to be more sophisticated.

Second, I use geographical proximity as a proxy for informed trading. Numerous studies document that investors located in geographical proximity to information sources possess informational advantages (Hau (2001), Shive (2011)). Coval and Moskowitz (2001) and Baik, Kang and Kim (2010)), and find that institutional investors enjoy excess returns on their holdings of locally headquartered firms. Individual investors may also earn excess returns on their local holdings (Ivkovic and Weisbenner (2005)).

In the third test, foreign institutional investors are separated into five groups based on investor class. While prior studies document that mutual funds and investment advisors may possess valuable information, those results might not be readily generalized to this setting given the foreign nature of this study. Instead, I hypothesize that in international markets, the most natural institutional group to possess valuable information is likely to be banks. Given the growing international nature of the banking business, banks may have access to privileged global information that is relevant for trading in many foreign countries as suggested in Albuquerque, Bauer and Schneider (2009). For example, McBrady, Mortal and Schill (2010) find that firms issue international bonds at opportunistic currency denominations, presumably under the advice of their bankers.

Dvorak (2005) finds global brokerage houses exhibit excess returns trading in Indonesian equities.[20]

If the improvement in liquidity from foreign institutional investors arises from information competition between foreign institutions and other shareholders, this effect should be more prominent for stocks located in countries with more opaque information environments. For the fourth test, I test the information competition effect of foreign institutional investors by across different information environments at the country level.

a. Sophisticated capital

To test whether sophisticated capital is the source of liquidity, I estimate the baseline panel regressions from equation (1) but separate foreign institutional ownership (FI_Own) into three groups based on the origin of capital: US-based (FIO_US), Non-US developed market based (FIO_DevNonUS), or emerging market based (FIO_Emg). US institutions are split into a separate group from the rest of the developed markets because they are the largest source of international capital. **Table 2.7A** presents results from these regressions. Column [1] presents the full sample results. The coefficient estimates on FIO_US and FIO_DevNonUS are negative (-0.026, -0.035) and statistically significant while the coefficient estimate on FIO_Emg is not statistically significant. This suggests that foreign institutions located in developed markets are primarily responsible for improving liquidity. Columns [2]-[4] report geographic subsamples and show similar effects across geographical regions. The coefficient estimates on both FIO_US and FIO_DevNonUS are negative and statistically significant across all geographical regions suggesting that capital from developed markets improve liquidity.

[20] These brokerage houses are international banks which include ABN Amro, Credit Lyonnais, HSBC, ING Baring, J.P. Morgan, Merrill Lynch, and UBS Warburg.

These results provide support for the hypothesis that the liquidity improvement is generated by sophisticated capital which is consistent with the information competition hypothesis. It should be noted that the Lionshares database has limited coverage of institutions located in emerging countries as local regulation has lower reporting requirements. An alternative interpretation of these results is that FIO_Emg is measured with considerable noise which makes it difficult to draw strong inferences from this analysis alone. Hence, I create additional tests in the following sub-sections to bolster the interpretation of the information competition hypothesis.

b. Geographic proximity

Since geographic proximity may proxy for information advantages, I separate institutions into groups depending on whether the institution is located within or outside three geographical regions (America, Asia, and Europe). Again, US institutions are separated into their own category since they are a larger group. **Table 2.7B** presents results from regressions of liquidity on foreign institutional ownership separated into geographical proximity based on the baseline panel specification in Equation (1).

Across all three subsamples in columns [5]–[7], FIO_US is negative and statistically significant suggesting that even across large distances US institutions have a positive effect on liquidity. The European subsample results are presented in column [5] and are the most consistent with the information competition hypothesis. The coefficient estimate on FIO_Europe is negative (-0.039) and statistically significant while the coefficient estimate on FIO_NonEuro is not statistically significant. This suggests that the liquidity improvement occurs primarily from institutional located within the European region. It is plausible that information effects are larger given the interconnected of European economies and the sharing of monetary policy through the Euro currency.

The results from the Asia and America subsample provide mixed evidence. In the Asia subsample presented in Column [6] of **Table 2.7B**, the coefficient estimate on FIO_Asia is negative and statistically significant but the coefficient estimate on FIO_NonAsia is also negative and statistically significant. This suggests that liquidity is improving from both regional and non-regional sources. Column [7] of **Table 2.7B** presents the results from the America subsample. The evidence here is inconsistent with the information competition hypothesis. Although both coefficient estimates on FIO_Amer and FIO_NonAmerica are both negative (-0.026, -0.028), only the coefficient estimate on FIO_NonAmerica is statistically significant. This suggests that the liquidity improvement for markets located in America originate from non-American institutions. A possible explanation is that there are large economic differences and greater geographical distances between North and South America and so geographic proximity is a poor proxy for information.

c. Institutional types

A key benefit of the Lionshares database is that it provides comprehensive details on the institutions it covers. I separate foreign institutional investors into five broad groups: 1. *Banks.* 2. *Hedge funds* which include arbitrage funds, brokers, market makers, stock borrowing institutions, and hedge funds, 3. *Insurance and Pensions funds* which include insurance companies, pensions, and endowment funds. 4. *Mutual funds* and *5.Investment advisors.*

The results in **Table 2.8** reveal that liquidity channel are primarily from banks and investment advisors. In both developed and emerging markets, the coefficient estimate on the bank class of institutions is negative and statistically significant. This is consistent with the evidence in Dvorak (2005) that international brokerage firms possess

informational advantages in international markets. It also supports the information competition hypothesis that informed trading may improve liquidity.[21] Since banks have ADR shares, it is possible that strong effect of foreign bank ownership on liquidity is driven by their holdings of ADR shares. To address this concern, I estimate additional regressions on sub-samples of stocks with ADR and without ADRs in columns [4] and [5]. The coefficient estimates on FIO_Bank remain negative and statistically significant in both subsamples which suggest that the impact of foreign banks on liquidity is not driven by ADRs.

d. Information opacity

If the liquidity effect of foreign institutional ownership arises from information competition with other informed traders, it is likely to be more important for firms located in markets with opaque information environments. Markets with high information asymmetry are likely to have more informed trading including potential insider trading.

I use several country-level financial and accounting information measures to proxy for the information environment in each country. These information measures include: 1. Accounting standards from the Global Competitiveness Report published by the World Economic Forum, 2. Anti-self dealing index (Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008)), 3. Prevalence of insider trading and 4. Financial disclosure (La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2002)). Insider trading is measured using the prevalence of insider trading measure reported from executive surveys collected by the World Economic Forum (Global Competitiveness Report). Griffin, Kelly and Hirschey (2010) find that the prevalence of insider trading can partially explain the

[21] According to Del Guercio (1996) banks invest in higher quality securities which may continue to receive more attention. This suggests that foreign institutions may draw attention to a stock from their ownership suggesting an alternative attention effect which attracts additional noise traders (Merton (1987)).

reaction to news announcements. For easier comparison, I create a dummy variable equal to 1 when the market index value lies below the 25th percent of all countries and 0 otherwise.

Table 2.9 presents the results of panel regressions that include an interaction term for foreign institutional ownership and information environment dummies. The results are consistent with the information competition channel. The interaction terms are negative and statistically significant for all four measures of information competition which suggest that the effect of foreign institutional ownership on liquidity is stronger in opaque markets. Although the direction of the effect is as predicted, a word of caution needs to be taken in interpreting the statistical significance of these results. Since the sample size is large, the marginal significance of these results should be interpreted as weak statistical evidence.

2.6 DISCUSSION AND CONCLUSION

This chapter examines the relationship between foreign institutional investors and stock liquidity across 34 equity markets. The findings indicate that increases in foreign institutional investment causally improve liquidity in both developed and emerging markets. The findings are also consistent with the informed actions of foreign institutional investors improving liquidity. Their trading increases the competition with other informed agents over trading profits which lowers informational asymmetries and improves liquidity.

This study also sheds light on our general understanding on the relationship between financial institutions and market liquidity. Since liquidity concurrently improved with the growth of financial institutions, it has been difficult to identify the direction of causality. To solve this challenge, I exploit the 2003 U. S. dividend tax cut as a natural

experiment to show that institutions causally improve liquidity. Given that financial institutions are a dominant player in financial markets, it is important for both policymakers and academics to clearly understand their role in financial markets.

While this study finds evidence in support of an information competition channel, there are likely to be other channels through which foreign institutions improve stock liquidity in the domestic market. Foreign institutional investors may improve liquidity indirectly. For example, foreign ownership tends to attract the attention of the news media and business press. They may also attract the attention of stock analysts who may facilitate the dissemination of public information. This could enhance recognition amongst uninformed investors who purchase the stock and increase noise trading. This attention effect may lead to higher liquidity (Merton (1987), Grullon, Kanatas, and Weston (2004)). Furthermore, theoretically the information competition channel should also make prices more informative.[22] Although this is beyond the scope of this study, the evidence is consistent with foreign institutions playing an important role in the price discovery process.

[22] Boehmer and Kelley (2009) find evidence that on the NYSE, stocks with greater institutional ownership are priced more efficiently.

Figure 2.1: A Time-Series Plot of the Average Amihud Measure

Description: The figure plots the cross-sectional value-weighted average of the log ILLIQ price impact measure (Amihud (2002)) by geographical

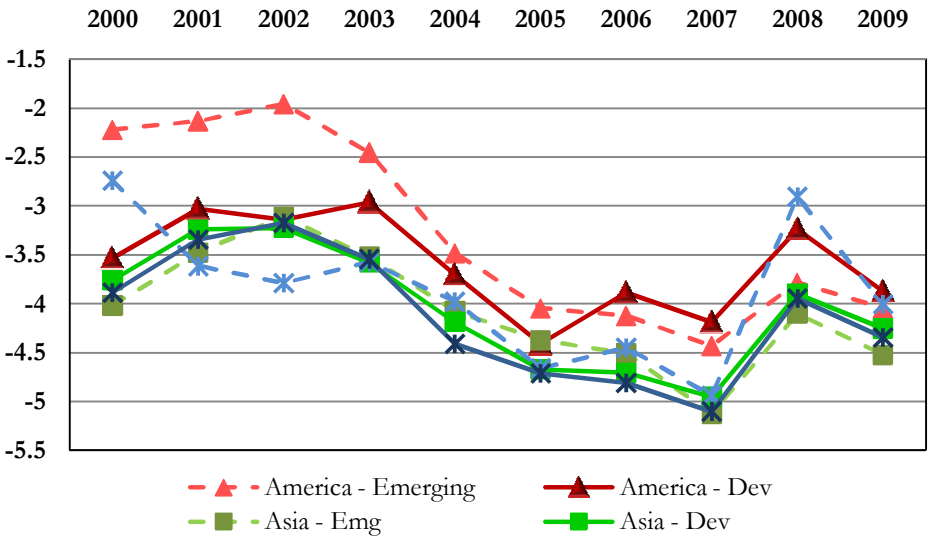

Figure 2.2: A Time-Series Plot of Foreign Institutional Ownership

Description: The figure plots the cross-sectional percentage foreign institutional ownership by geographical region and market development from 2000-2009.

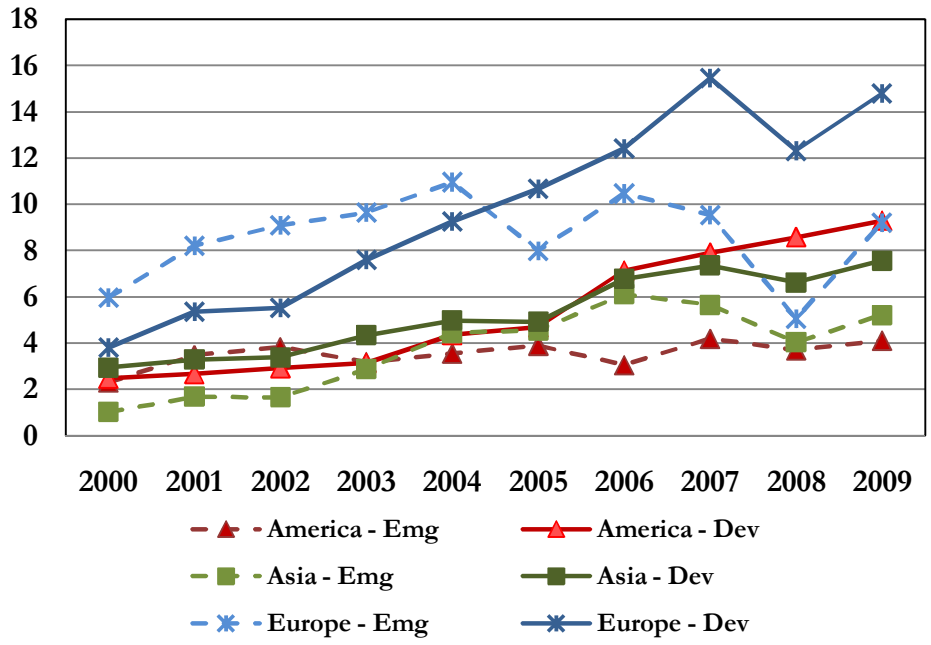

Figure 2.3: Country Level Coefficient Estimates of Liquidity on Foreign Institutional Ownership

Description: This figure presents coefficient estimates of liquidity of foreign institutional ownership from the following regresision:

$$ILLIQ_{firm,t+1} = a + \beta_1 * FI\_Own_{firm,t} + \Sigma_j \beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,t}$$

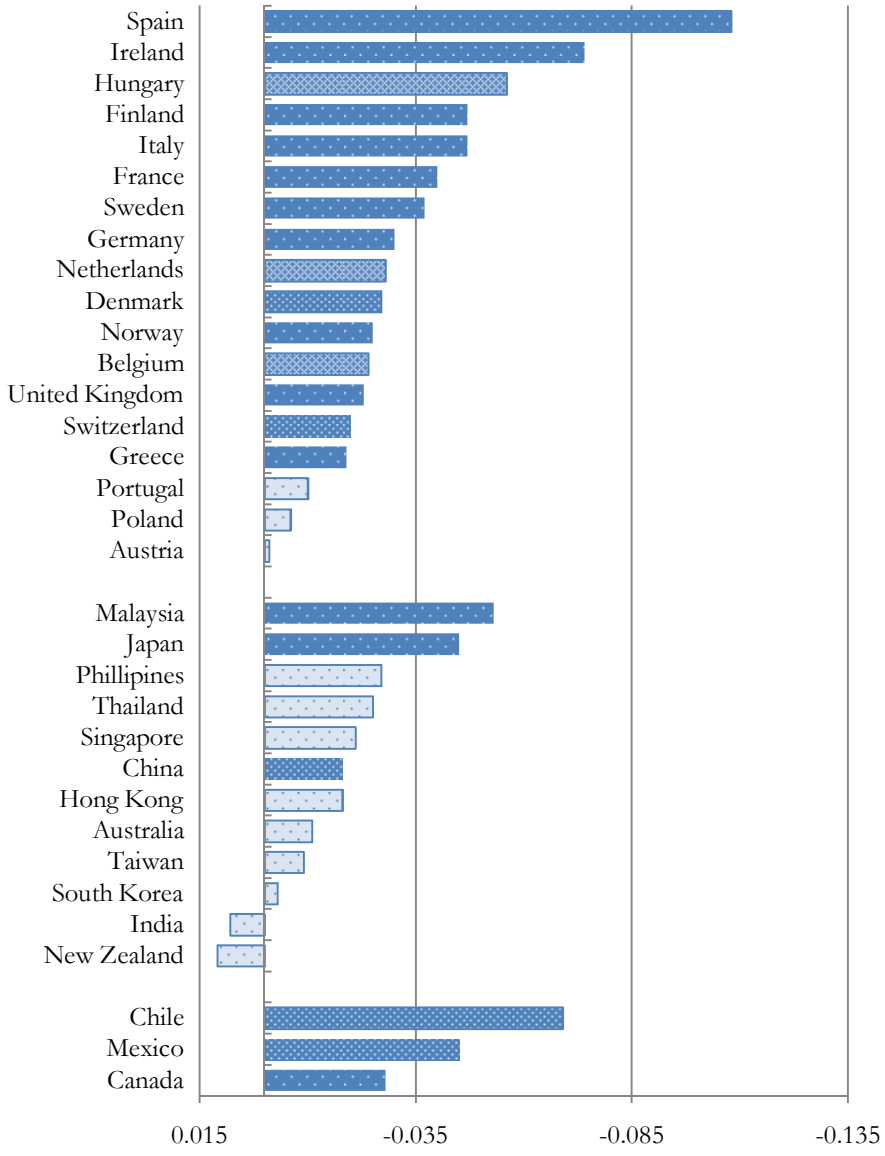

Figure 2.4: Annual Coefficient Estimates of Liquidity on Foreign Institutional Ownership

Description: This figure presents cross-sectional annual coefficient estimates of liquidity on foreign institutional ownership from the regression model: $ILLIQ_{firm,\,t+1} = a + \beta_1 * FI\_Own_{firm,\,t} + \Sigma\beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,\,t}$ where *Illiq* is the logarithm of annual ILLIQ measure (Amihud (2002)), *FI_Own* is the % share ownership of foreign institutional investors, *Firm characteristics* include seven control variables (*Mktcap, Mktcap*^{2}*, Ret, Turn, Vol, MTBV,* and *Analysts*), $\gamma_{k,t}$ is a country *k*, year *t* fixed effect and φ_{firm} is a firm fixed effect. Complete variable definitions are described in Table 1. The sample period is from 2000 to 2009. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

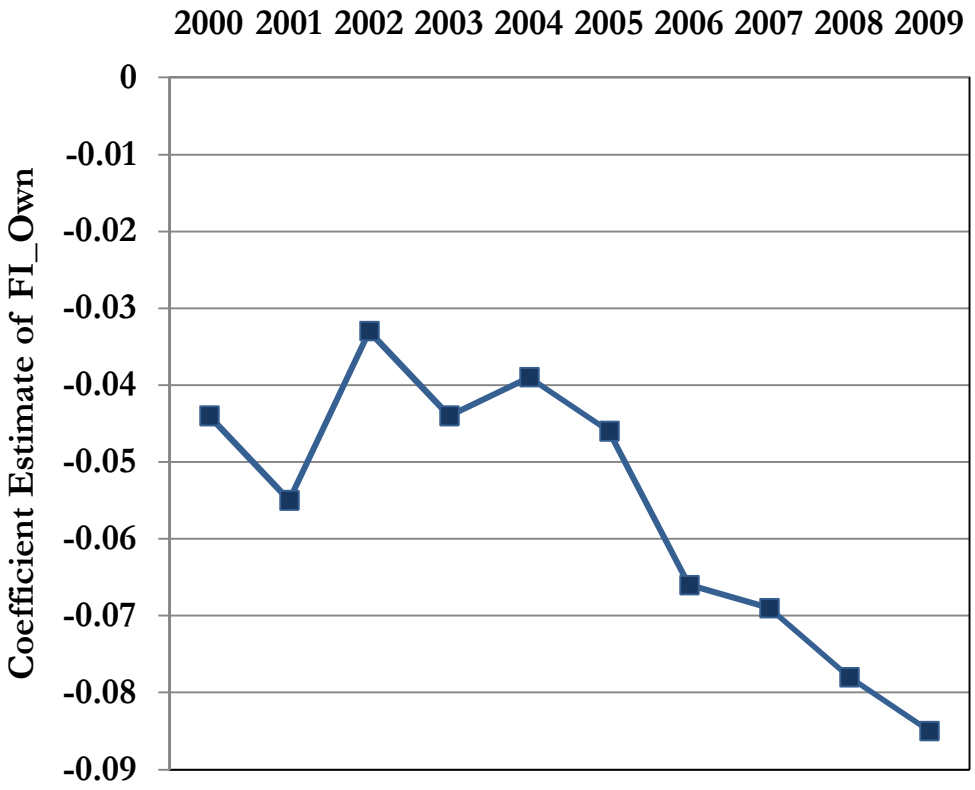

Table 2.1: Variable Definitions

Description: This table presents the names, definitions and data sources for the variables used in this study.

		Definition	**Source**
		Institutional Ownership variables	
Foreign Institutions Ownership	*FI_Own*	Foreign institutional share ownership as a percentage of total shares outstanding.	Lionshares
Domestic Institutions Ownership	*DI_Own*	Domestic institutional share ownership as a percentage of total shares outstanding.	Lionshares
Foreign Institutions Number	*FI_Num*	Foreign institutional share ownership as a percentage of total shares outstanding.	Lionshares
Domestic Institutions Number	*DI_Num*	Domestic institutional share ownership as a percentage of total shares outstanding.	Lionshares
Liquidity Variables			
Illiquidity	*ILLIQ*	Log of average daily ratio of the absolute stock return divided by the US$ volume traded calculated following Amihud (2002)	Datastream
Percentage Zeros	*ZEROS*	Log of the proportion of zero daily returns during the year.	Datastream
		Firm Level Control Variables	
Market Capitalization	*Mktcap*	Market capitalization in US dollars at the end of the year	Datastream
Market-to-Book	*MTBV*	Log of market-to-book equity ratio (market value is Datastream item MV and book value of equity is Worldscope item 03501)	Datastream/Worldscope
Annual Stock Return	*Ret*	Annual stock return	Datastream
Turnover	*Turn*	Annual summation of daily percentage stock turnover	Datastream
Stock Volatility	*Vol*	Log of the standard deviation of daily stock return	Datastream
Insider Holdings	*Inside*	Number of Closely Held Shares / Common Shares Outstanding (Worldscope item 08021)	Worldscope
Dividend Yield	*DY*	Dividend Yield (Worldscope item 09404)	Worldscope
Number of analysts	*Analyst*	Number of Analysts (IBES item Numest)	I/B/E/S International

Table 2.2A: Summary Statistics

Description: This table presents the time-series cross-sectional mean of firm level variables by country. # of firms is the number of firms in a country. Size is the market capitalization in US dollars. Illiq is the Amihud illiquidity measure calculated in local currency. Illiq$ is the Amihud illiquidity measure scaled using US dollars. summary statistics. Zeros is the percentage of daily zero return days during the year. FI_Own denotes foreign institutional ownership as a percentage of shares outstanding. DI_Own denotes domestic foreign institutional ownership as a percentage of shares outstanding. FI_Num is the number of foreign institutional investors with a position in the stock. DI_Num is the number of domestic institutional investors with a position in the stock. RET is the annual stock return. TURN is the annual turnover. VOL is the standard deviation of returns. MTBV is the market-to-book ratio. INSIDE is the percentage of shares held by corporate insiders. The sample is from 2000 to 2009.

Panel A. Emerging Markets

Country	**# Firm**	**Mktcap**	**Illiq**	**Illiq$**	**Zeros**	**FI_Own**	**DI_Own**	**FI_Num**	**DI_Num**	**Ret**	**Turn**	**MTBV**	**Inside**
Chile	80	1123	-6.65	-0.27	0.48	0.73	0.35	4.7	0.3	1.25	0.15	0.20	60.3
China	978	507	-6.08	-4.01	0.08	0.11	1.71	0.2	1.1	1.32	2.17	1.22	54.8
Hungary	22	523	-5.77	-0.37	0.18	6.85	0.67	21.2	1.5	1.11	0.70	0.06	59.1
India	477	688	-4.04	-0.21	0.05	2.02	2.08	5.9	3.1	1.46	0.42	0.32	52.4
Italy	185	686	-2.06	-2.21	0.11	3.17	1.72	16.1	4.8	1.02	0.61	0.41	51.4
Lithuania	13	312	0.21	1.21	0.31	8.22	0.23	6.5	0.4	1.48	0.15	0.12	67.1
Malaysia	583	249	-0.22	1.09	0.34	0.91	0.33	4.9	0.9	1.06	0.44	-0.02	49.0
Mexico	35	1568	-2.83	-0.45	0.19	4.54	0.43	22.1	0.9	1.28	0.30	0.13	49.8
Philippines	74	355	-2.04	1.88	0.52	2.55	0.03	8.7	0.2	1.32	0.29	-0.11	68.1
Poland	121	484	-1.42	-0.18	0.16	3.20	8.79	13.3	5.5	1.32	0.65	0.32	58.1
South Korea	722	206	-8.75	-1.72	0.11	2.23	0.11	5.1	0.1	1.21	2.35	-0.38	38.7
Taiwan	773	218	-5.45	-1.95	0.14	1.24	0.15	4.6	0.3	1.16	1.84	0.16	26.2
Thailand	231	293	-3.05	0.62	0.30	1.74	0.47	6.0	1.3	1.25	0.76	0.05	54.4
Emerging Average		382	-4.91	-1.43	0.16	1.34	1.01	4.4	1.1	1.23	1.40	0.32	46.9

Table 2.2B: Summary Statistics Continued

Panel B. Developed Markets

Country	# Firms	Size	Illiq	Illiq$	Zeros	FI_Own	DI_Own	FI_Num	DI_Num	Ret	Turn	MTBV	Inside
Australia	816	223	0.82	0.43	0.33	1.70	0.68	5.5	0.8	1.21	0.60	0.60	36.9
Austria	50	1060	-1.01	-0.86	0.29	6.28	1.36	34.3	5.7	1.19	0.33	0.29	57.2
Belgium	80	567	-0.61	-0.46	0.26	4.10	2.45	17.6	4.6	1.09	0.22	0.37	53.5
Canada	962	229	1.12	0.86	0.30	2.52	6.88	3.5	5.3	1.32	0.54	0.51	27.4
Denmark	141	520	-0.52	-2.37	0.39	2.23	7.16	11.7	3.8	1.17	0.33	0.36	40.1
Finland	104	457	-0.43	-0.28	0.29	5.88	7.19	17.9	6.3	1.13	0.41	0.57	35.9
France	528	604	0.48	0.26	0.27	2.90	3.16	12.4	7.8	1.11	0.33	0.52	58.0
Germany	487	1572	0.78	0.93	0.22	4.23	3.54	27.6	8.4	1.07	0.23	0.36	49.9
Greece	250	292	-0.37	-0.22	0.16	1.35	0.13	7.6	0.4	0.91	0.57	0.40	56.6
Hong Kong	551	370	0.21	-1.84	0.35	2.71	0.86	11.1	1.5	1.32	0.68	0.04	56.2
Ireland	38	1241	-0.75	-0.60	0.18	12.43	0.60	44.9	2.2	1.14	0.41	0.55	29.4
Japan	3079	375	-1.26	-5.98	0.25	1.48	1.58	10.1	6.1	1.06	0.54	-0.01	43.4
Netherlands	97	531	-1.10	-0.95	0.24	6.39	4.23	19.6	1.6	1.11	0.68	0.57	44.1
New Zealand	72	277	0.28	-0.25	0.43	2.09	0.55	9.5	0.6	1.12	0.21	0.48	52.2
Norway	137	331	-0.34	-2.28	0.37	4.24	6.89	11.9	4.1	1.20	0.83	0.31	41.4
Portugal	38	813	-0.64	-0.48	0.28	2.18	3.03	24.2	7.3	1.10	0.38	0.40	64.9
Singapore	355	226	0.90	0.41	0.43	1.74	0.48	6.9	0.9	1.15	0.56	0.12	54.6
Spain	80	1167	-2.94	-2.79	0.18	3.31	3.11	21.4	20.3	1.13	0.57	0.65	48.7
Sweden	242	247	-0.13	-2.22	0.26	3.44	8.82	8.6	5.1	1.11	0.63	0.79	37.7
Switzerland	159	707	-1.46	-1.74	0.28	5.27	5.01	15.8	7.9	1.10	0.32	0.39	45.7
UK.	1101	247	-0.71	-0.19	0.52	1.93	12.55	5.6	10.8	1.06	0.60	0.52	34.9
Developed Average		422	-2.07	-0.32	0.31	2.33	3.78	10.1	5.5	1.13	0.53	0.30	43.9

Table 2.3: Regression of Liquidity on Foreign Institutional Ownership

Description: This table reports coefficient estimates from the annual baseline panel regression specification:

$$Liquidity_{firm,\,t+1} = a + \beta_1 * FI\_Own_{firm,\,t} + \Sigma_j \beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,\,t}$$

where *Liquidity* is measured as either the logarithm of annual *ILLIQ* measure (Amihud (2002)) or the logarithm of annual *ZEROs* measure, *FI_Own* is the % share ownership of foreign institutional investors, $\gamma_{k,t}$ is a country *k*, year *t* fixed effect and φ_{firm} is a firm fixed effect. Specifications [2] - [6] include additional explanatory variables: *FI_Num* denotes the number of foreign institutions and *DI_Own* denotes the % share ownership of domestic institutional investors. Complete variable definitions are described in Table 1. The sample period is from 2000 to 2009. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

	[1]	[2]	[3]	[4]	[5]	[6]
	Illiq	*Illiq*	*Zeros*	*Illiq*	*Illiq*	*Illiq*
FI_Own	-0.031***	-0.018***	-0.008***		-0.020***	-0.028***
	[-14.557]	[-7.861]	[-8.949]		[-6.649]	[-13.488]
FI_Num		-0.008***	-0.001***			
		[-9.557]	[-3.251]			
DI_Own				-0.014***	-0.012***	-0.017***
				[-7.208]	[-6.604]	[-12.940]
Mktcap	-0.204***	-0.153***	-0.043***	-0.129***	-0.114***	-0.204***
	[-8.336]	[-7.377]	[-6.868]	[-4.921]	[-4.524]	[-8.367]
Mktcap^2	1.395***	1.192***	0.329***	0.781***	0.705***	1.389***
	[4.728]	[4.432]	[4.595]	[3.887]	[3.733]	[4.732]
Ret	-0.318***	-0.321***	-0.077***	-0.465***	-0.466***	-0.317***
	[-21.511]	[-21.506]	[-20.226]	[-29.140]	[-29.315]	[-21.526]
MTBV	-0.203***	-0.199***	-0.065***	-0.194***	-0.188***	-0.200***
	[-19.915]	[-19.627]	[-16.761]	[-11.418]	[-11.127]	[-19.687]
Turn	-0.249***	-0.245***	-0.029***	-0.267***	-0.265***	-0.249***
	[-34.312]	[-34.016]	[-11.824]	[-10.087]	[-10.054]	[-34.429]
Vol	0.397***	0.408***	-0.019**	0.432***	0.433***	0.385***
	[20.530]	[21.088]	[-2.254]	[13.425]	[13.528]	[20.022]
Analyst	-0.082***	-0.078***	-0.023***	-0.089***	-0.085***	-0.080***
	[-23.507]	[-22.452]	[-14.992]	[-14.580]	[-14.063]	[-23.033]
Observations	127511	127511	127511	26730	26730	127511
Adjusted R-squared	0.883	0.941	0.819	0.875	0.875	0.940

Table 2.4: Regression of Change in Liquidity on Change in Foreign Institutional Ownership

Description: This table reports coefficient estimates from the annual baseline panel regression specification:

$$\Delta Liquidity_{firm,\,t+1} = a + \beta_1 * \Delta FI\_Own_{firm,\,t} + \Sigma_j \beta_j * \Delta Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varepsilon_{firm,\,t}$$

where $\Delta Liquidity$ is measured as the annual change in the logarithm of the ILLIQ measure (Amihud (2002)) or the logarithm of the ZEROs measure. $\gamma_{k,t}$ denotes a county k, year t fixed effect. Specifications [2] - [6] include additional explanatory variables ΔFI_Num which is the number of foreign institutions and ΔDI_Own which is the % share ownership of domestic institutional investors. Complete variable definitions are presented in Table 1. The sample period is from 2000 to 2009. T-statistics are presented in brackets. Standard errors are robust and clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

	[1]	[2]	[3]	[4]	[5]	[6]
	Illiq	*Illiq*	*Zeros*	*Illiq*	*Illiq*	*Illiq*
Δ FI_Own	-0.014***	-0.005***	-0.002**		-0.013***	-0.013***
	[-8.187]	[-2.914]	[-1.995]		[-4.262]	[-7.623]
Δ FI_Num		-0.006***	-0.001***			
		[-12.993]	[-5.147]			
Δ DI_Own				-0.004***	-0.004***	-0.006***
				[-3.024]	[-2.747]	[-6.783]
Mktcap	-0.078***	-0.067***	-0.006*	-0.035***	-0.032***	-0.079***
	[-6.680]	[-6.132]	[-1.647]	[-3.680]	[-3.377]	[-6.697]
Mktcap²	0.493***	0.444***	0.083***	0.216***	0.201***	0.494***
	[4.745]	[4.546]	[3.132]	[3.380]	[3.247]	[4.750]
Ret	-0.182***	-0.182***	-0.045***	-0.234***	-0.233***	-0.182***
	[-24.992]	[-25.009]	[-18.256]	[-23.442]	[-23.449]	[-24.984]
MTBV	0.032***	0.035***	0.005*	-0.003	-0.001	0.033***
	[4.791]	[5.187]	[1.832]	[-0.253]	[-0.085]	[4.877]
Turn	-0.008*	-0.007	0.006***	-0.018	-0.018	-0.007
	[-1.731]	[-1.526]	[3.283]	[-1.213]	[-1.257]	[-1.639]
Vol	-0.139***	-0.136***	0.064***	-0.017	-0.018	-0.142***
	[-11.136]	[-10.889]	[11.368]	[-0.733]	[-0.746]	[-11.365]
Analyst	-0.013***	-0.011***	-0.004***	-0.006	-0.005	-0.013***
	[-5.754]	[-4.516]	[-3.779]	[-1.378]	[-1.126]	[-5.516]
Observations	102007	102007	102007	20807	20807	102007
Adjusted R-squared	0.382	0.383	0.244	0.308	0.309	0.382

Table 2.5: Regression of Liquidity on Foreign Institutional Ownership: Subsample

Description: This table reports coefficient estimates from the annual baseline panel regression specification:

$$ILLIQ_{firm,\,t+1} = a + \beta_1 * FI\_Own_{firm,\,t} + \Sigma_j \beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,\,t}$$

ILLIQ is the logarithm of annual *ILLIQ* measure (Amihud (2002)), *FI_Own* is the % ownership of foreign institutional investors, $\gamma_{k,t}$ is a country *k*, year *t* fixed effect and φ_{firm} is a firm fixed effect. Subsamples are based on financial development (*Developed, Emerging*), ADR listing (*ADR, Non-ADR*), and geographic region (*Asia, America, Europe*). Variable definitions are in Table 1. The sample period is from 2000 to 2009. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
	Developed	*Emerging*	*Non-ADR*	*ADR*	*Asia*	*America*	*Europe*
FI_Own	-0.030***	-0.027***	-0.030***	-0.028***	-0.029***	-0.030***	-0.028***
	[-12.663]	[-7.145]	[-13.578]	[-4.070]	[-8.216]	[-5.296]	[-11.206]
Mktcap	-0.195***	-0.301***	-0.316***	-0.096***	-0.347***	-0.708***	-0.144***
	[-6.367]	[-6.333]	[-8.049]	[-4.607]	[-12.948]	[-8.273]	[-5.303]
Mktcap^2	1.313***	6.302**	3.585***	0.491***	5.128***	22.756***	0.910***
	[4.266]	[2.150]	[2.958]	[3.704]	[7.422]	[4.304]	[4.192]
Ret	-0.323***	-0.267***	-0.311***	-0.345***	-0.327***	-0.328***	-0.270***
	[-17.158]	[-18.882]	[-20.757]	[-8.119]	[-26.519]	[-16.823]	[-8.136]
MTBV	-0.200***	-0.193***	-0.190***	-0.383***	-0.234***	-0.085***	-0.170***
	[-17.365]	[-9.047]	[-18.333]	[-5.289]	[-17.114]	[-3.091]	[-10.137]
Turn	-0.303***	-0.189***	-0.252***	-0.204***	-0.234***	-0.652***	-0.231***
	[-25.479]	[-20.686]	[-34.233]	[-4.951]	[-31.345]	[-12.217]	[-11.466]
Vol	0.497***	0.000	0.413***	-0.183	0.287***	1.126***	0.394***
	[23.057]	[0.003]	[21.305]	[-1.372]	[11.098]	[15.445]	[13.459]
Analyst	-0.090***	-0.060***	-0.082***	-0.081***	-0.084***	-0.120***	-0.067***
	[-22.016]	[-9.282]	[-22.439]	[-6.334]	[-17.484]	[-7.756]	[-13.323]
Observations	89391	38120	123538	3973	81246	9977	36288
Adjusted R-squared	0.937	0.920	0.941	0.902	0.936	0.908	0.873

Table 2.6: Difference in Difference Regressions

Description: This table reports coefficient estimates from three regression specifications. Columns [1] and [2] report the results from equation (1):

$$FI\_Own_{i,t} = a + \beta_1 * Qualified_{i,t} + \beta_2 * Post\ 2002_{i,t} + \beta_3 * Qualified * Post2002_{i,t} + \Sigma_j \beta_j * Firm\ char._{i,t} + \gamma_{k,t} + \varepsilon_{i,t} \quad (1)$$

where the dependant variable *FI_Own* is either the % share ownership of US tax-sensitive institutions (*US Tax*) which are defined to be all US-based mutual funds or US Pension funds (*US Pension*) and the independant variables are: *Qualified* is a dummy variable equal to 1 when a stock pays a dividend & is located in a tax-treaty country, *Post 2002* is a dummy equal to 1 after 2002, *Qualified*Post2002* is the interaction of the two variables, *Firm char* are seven firm characteristics described in Table 1, and γ_k is a country *k* fixed effect. Columns [3]-[4] replace the dependant variable with Liquidity as specified in Equation (2):

$$ILLIQ_{i,t} = a + \beta_1 * Qualified_{i,t} + \beta_2 * Post\ 2002_{i,t} + \beta_3 * Qualified * Post2002_{i,t} + \Sigma_j \beta_j * Firm\ char._{i,t} + \gamma_{k,t} + \varepsilon_{i,t} \quad (2)$$

where *ILLIQ* is measured as either the logarithm of annual *ILLIQ* measure (Amihud (2002)) or the logarithm of the Zeros trading cost measure. The sample periods is from 2002 to 2004. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

	[1]	[2]	[3]	[4]
	US Tax	*US Pension*	*Illiq*	*Zeros*
Qualified	-0.011	0.004	-0.093***	-0.040**
	[-0.894]	[1.085]	[-2.697]	[-2.500]
Post 2002	0.025***	0.000	-0.316***	-0.011
	[3.285]	[0.057]	[-15.314]	[-1.480]
Qualified Dummy * Post2002	0.029***	-0.002	-0.281***	-0.143***
	[2.903]	[-0.677]	[-10.387]	[-12.839]
Mktcap	0.000***	0.000***	-0.001***	-0.000***
	[4.734]	[3.034]	[-6.158]	[-4.841]
Mktcap^2	-1.191***	-0.163***	9.599***	2.051***
	[-4.369]	[-2.999]	[4.578]	[4.014]
Ret	0.046***	0.001	-0.630***	-0.137***
	[5.581]	[1.010]	[-35.801]	[-21.371]
MTBV	0.007	0.000	-0.171***	-0.083***
	[1.331]	[0.181]	[-10.995]	[-12.481]
Turn	0.028***	0.002*	-0.647***	-0.134***
	[5.419]	[1.691]	[-34.947]	[-22.263]
Vol	-0.022*	0.002	1.358***	0.047***
	[-1.908]	[0.815]	[43.962]	[3.001]
Analyst	0.034***	0.005***	-0.233***	-0.068***
	[14.603]	[7.907]	[-46.575]	[-30.402]
Observations	34399	34399	34399	34399
Adjusted R-squared	0.106	0.052	0.654	0.513

Table 2.7A: Liquidity on Foreign Institutional Ownership: Geographical Determinant

Description: This table reportscoefficient estimates from the regression specification:

$$Illiq_{firm,\,t+1} = a + \beta_1 * FI\_Source_{firm,\,t} + \Sigma_j \beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,\,t}$$

where *ILLIQ* is the logarithm of Amihud's ILLIQ measure, *FIO_Source* is the % share ownership of foreign institutional investors where *Source* is either the region of origin (*America, Asia, Europe*) or development origin (*US, Non-US Developed, Emerging*). $\gamma_{k,t}$ is a country k, year t fixed effect and φ_{firm} is a firm fixed effect. Complete variable definitions are in Table 1. The sample periods is from 2000 to 2009. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

Panel A. Institutional Sophistication				
	[1]	[2]	[3]	[4]
	All	*Europe*	*Asia*	*America*
FIO_US	-0.026***	-0.017***	-0.018***	-0.031***
	[-6.582]	[-3.613]	[-3.168]	[-3.628]
FIO_DevNonUS	-0.035***	-0.037***	-0.036***	-0.030***
	[-11.081]	[-10.086]	[-5.938]	[-3.682]
FIO_Emg	-0.001	0.033	-0.021	-0.091*
	[-0.086]	[1.354]	[-0.976]	[-1.727]
Mktcap	-0.205***	-0.147***	-0.348***	-0.707***
	[-8.361]	[-5.418]	[-12.923]	[-8.257]
Mktcap^2	1.398***	0.926***	5.144***	22.722***
	[4.734]	[4.237]	[7.400]	[4.299]
Ret	-0.318***	-0.270***	-0.327***	-0.328***
	[-21.527]	[-8.137]	[-26.545]	[-16.869]
MTBV	-0.202***	-0.169***	-0.233***	-0.084***
	[-19.812]	[-10.079]	[-17.056]	[-3.068]
Turn	-0.249***	-0.232***	-0.233***	-0.651***
	[-34.323]	[-11.506]	[-31.317]	[-12.185]
Vol	0.397***	0.392***	0.286***	1.127***
	[20.524]	[13.398]	[11.052]	[15.442]
Analyst	-0.082***	-0.067***	-0.084***	-0.120***
	[-23.532]	[-13.274]	[-17.463]	[-7.733]
Observations	127511	36288	81246	9977
Adjusted R-squared	0.940	0.873	0.936	0.908

Table 2.7B: Liquidity on Foreign Institutional Ownership: Geographical Determinants

Description: This table reportscoefficient estimates from the regression specification:

$$Illiq_{firm,\,t+1} = a + \beta_1 * FI\_Source_{firm,\,t} + \Sigma_j \beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,\,t}$$

where *ILLIQ* is the logarithm of Amihud's ILLIQ measure, *FIO_Source* is the % share ownership of foreign institutional investors where *Source* is either the region of origin (*America, Asia, Europe*) or development origin (*US, Non-US Developed, Emerging*). $\gamma_{k,t}$ is a country *k*, year *t* fixed effect and φ_{firm} is a firm fixed effect. Complete variable definitions are in Table 1. The sample periods is from 2000 to 2009. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

Panel B. Geographical Proximity

	[5]	[6]	[7]
	Europe	*Asia*	*America*
FIO_US	-0.017***	-0.018***	-0.031***
	[-3.518]	[-3.152]	[-3.651]
FIO_Europe	-0.039***		
	[-11.181]		
FIO_NonEuro	0.015		
	[1.185]		
FIO_Asia		-0.031***	
		[-4.630]	
FIO_NonAsia		-0.037***	
		[-4.364]	
FIO_Amer			-0.026
			[-0.914]
FIO_NonAmerica			-0.028***
			[-3.632]
Mktcap	-0.144***	-0.348***	-0.707***
	[-5.324]	[-12.961]	[-8.257]
Mktcap^2	0.910***	5.141***	22.739***
	[4.190]	[7.437]	[4.300]
Ret	-0.270***	-0.327***	-0.327***
	[-8.133]	[-26.525]	[-16.829]
MTBV	-0.169***	-0.234***	-0.085***
	[-10.151]	[-17.106]	[-3.084]
Turn	-0.232***	-0.233***	-0.651***
	[-11.513]	[-31.301]	[-12.177]
Vol	0.392***	0.286***	1.126***
	[13.407]	[11.058]	[15.410]
Analyst	-0.067***	-0.084***	-0.120***
	[-13.229]	[-17.473]	[-7.730]
Observations	36288	81246	9977
Adjusted R-squared	0.874	0.936	0.907

Table 2.8: Stock Liquidity and Institutional Investor Types

Description: This table reports coefficient estimates from the regression specification:

$$ILLIQ_{firm,\,t+1} = a + \beta_1 * FI\_Source_{firm,\,t} + \Sigma\beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,\,t}$$

where *ILLIQ* is the logarithm of the Amihud ILLIQ measure, *FIO Bank, FIO Mutual, FIO Inves, FIO Insur and FIO Hedge* are the % share ownership of foreign institutional investors classified as mutual funds, investment advisors, insurance and pension funds and hedge funds. $\gamma_{k,t}$ is a country *k*, year *t* fixed effect. φ_i is a firm fixed effect. Complete variable definitions are in Table 1. The sample periods is from 2000 to 2009. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

	[1]	[2]	[3]	[4]	[5]
	All Countries	*Developed*	*Emerging*	*ADR*	*Non-ADR*
FIO Bank	-0.078***	-0.084***	-0.049***	-0.077***	-0.074***
	[-11.556]	[-10.693]	[-4.002]	[-3.533]	[-10.555]
FIO Investment	-0.025***	-0.025***	-0.020***	-0.011	-0.025***
	[-8.326]	[-7.416]	[-3.713]	[-1.071]	[-8.134]
FIO Mutual	-0.016***	-0.013*	-0.018*	-0.010	-0.016***
	[-2.586]	[-1.926]	[-1.896]	[-0.429]	[-2.731]
FIO Insur	-0.034	-0.027	-0.099***	-0.107**	-0.032
	[-1.423]	[-1.142]	[-2.951]	[-2.444]	[-1.319]
FIO Hedge	-0.023**	-0.021*	-0.029	-0.101**	-0.018
	[-2.087]	[-1.833]	[-1.095]	[-1.979]	[-1.599]
Mktcap	-0.201***	-0.191***	-0.297***	-0.092***	-0.313***
	[-8.269]	[-6.324]	[-6.252]	[-4.491]	[-8.008]
Mktcap^2	1.374***	1.289***	6.227**	0.472***	3.545***
	[4.701]	[4.238]	[2.134]	[3.601]	[2.951]
Ret	-0.318***	-0.323***	-0.267***	-0.342***	-0.311***
	[-21.518]	[-17.158]	[-19.030]	[-8.235]	[-20.755]
MTBV	-0.201***	-0.198***	-0.192***	-0.375***	-0.189***
	[-19.759]	[-17.269]	[-9.017]	[-5.259]	[-18.248]
Turn	-0.248***	-0.301***	-0.188***	-0.206***	-0.251***
	[-34.272]	[-25.424]	[-20.689]	[-5.028]	[-34.192]
Vol	0.398***	0.498***	0.002	-0.166	0.414***
	[20.623]	[23.163]	[0.049]	[-1.253]	[21.384]
Analyst	-0.081***	-0.089***	-0.060***	-0.080***	-0.081***
	[-23.361]	[-21.840]	[-9.292]	[-6.328]	[-22.243]
Observations	127511	89391	38120	3973	123538
Adjusted R-squared	0.940	0.937	0.921	0.902	0.941

Table 2.9: Stock Liquidity and Information Environment

Description: This table reports coefficient estimates from the regression specification:

$$ILLIQ_{firm,\,t+1} = a + \beta_1 * FI\_Own_{firm,\,t} + \beta_2 * FI\_Own * Country\ Env_{firm,\,t} + \Sigma_j \beta_j * Firm\ characteristics_{firm,t} + \gamma_{k,t} + \varphi_{firm} + \varepsilon_{firm,\,t}$$

where *ILLIQ* is the logarithm of the Amihud ILLIQ measure, *FI_Own* is the % share ownership of foreign institutional investors, *FI_Own*Country Env* is the interaction of *FI_Own* and *Country Environment Index* which is equal to either: Accounting Standards (*Acct*), Anti Self Dealing Index (*ANSI*), Prevelance of Insider Trading (*Insider*) or Financial Disclosure (*Disclose*). $\gamma_{k,t}$ is a country k, year t fixed effect. φ_i is a firm fixed effect. Complete variable definitions are in Table 1. The sample periods is from 2000 to 2009. Robust t-statistics are presented in brackets. Standard errors are clustered by firm. *** p<0.01, ** p<0.05, * p<0.1

	[1]	[2]	[3]	[4]
FI_Own	-0.030***	-0.029***	-0.030***	-0.026***
	[-13.539]	[-13.365]	[-13.802]	[-10.169]
FI_Own * Acct	-0.014**			
	[-2.075]			
FI_Own * ANSI		-0.012*		
		[-1.935]		
FI_Own * Insider			-0.019**	
			[-2.122]	
FI_Own * Disclose				-0.011***
				[-2.676]
Mktcap	-0.204***	-0.204***	-0.204***	-0.205***
	[-8.336]	[-8.340]	[-8.335]	[-8.377]
Mktcap^2	1.393***	1.394***	1.393***	1.397***
	[4.728]	[4.729]	[4.728]	[4.734]
Ret	-0.317***	-0.318***	-0.317***	-0.318***
	[-21.500]	[-21.504]	[-21.493]	[-21.529]
MTBV	-0.202***	-0.203***	-0.202***	-0.203***
	[-19.850]	[-19.874]	[-19.854]	[-19.866]
Turn	-0.249***	-0.249***	-0.249***	-0.248***
	[-34.325]	[-34.291]	[-34.325]	[-34.238]
Vol	0.397***	0.397***	0.397***	0.397***
	[20.524]	[20.542]	[20.523]	[20.534]
Analyst	-0.082***	-0.082***	-0.082***	-0.082***
	[-23.514]	[-23.555]	[-23.493]	[-23.557]
Observations	127511	127511	127511	127511
Adjusted R-squared	0.940	0.940	0.940	0.940

Chapter 3: Mutual Fund Manager Disagreement

3.1 INTRODUCTION

Financial economists have long sought to understand how different pieces of information aggregate into prices. Traditional asset pricing models typically rely on a representative agent framework where investors possess homogenous beliefs. However, it is often noted that market participants hold differences of opinion even in situations when investors possess common information. This intriguing characteristic of financial markets has motivated a rapidly growing literature examining the role of heterogeneous beliefs on the formation of asset prices and equilibrium risk premia. In light of this promising development, Hong and Stein (2007) proclaim that heterogeneous-agent models 'represent the best horse on which to bet.'

Yet, within this body of literature, a consensus of *how* heterogeneous beliefs affect asset prices remains elusive. In a model with short-sale constraints, differences of opinion may lead to over-valuation since the stock price would reflect only the views of the optimists (Miller (1977), Chen, Hong and Stein (2002)). This over-valuation theory predicts lower future stock returns. Alternatively, if there are rational arbitrageurs or rational market makers who do not face these short sale constraints, prices would remain unbiased and there would be no relationship between differences of opinion and future returns (Diamond and Verrecchia (1987), Hong and Stein (2003)). On the other hand, rational models argue that differences of opinion imply a high level of information uncertainty or parameter uncertainty regarding a stock which would predict higher expected returns (Williams (1977), Barry and Brown (1985), Basak (2000), Buraschi and Jiltsov (2006)). These three theories - the overvaluation theory, arbitrageur theory and information uncertainty - present three alternative and empirically testable hypotheses.

Unfortunately, taking the theory to the data remains a considerable challenge due to the paucity of empirical measures for differences of opinion amongst investors. One of the most prominent measures is analyst forecast dispersion proposed in Diether, Malloy and Scherbina (2002). They find that stocks with high analyst forecast dispersion earn lower future stock returns. The authors interpret this finding as support of the overvaluation hypothesis (Miller (1977)). However, alternative interpretations have been proposed which suggests that analyst dispersion may instead measure uncertainty about future cash flows (Johnson (2004)) or default risk (Avramov, Chordia, Jostova, and Philipov (2009)). Furthermore, adaptations to this measure which control for forecast error (Doukas, Kim and Pantzalis (2006), Barron, Stanford and Yu (2008)), short or longer term forecasts (Anderson, Ghysels and Juergens (2005)), analyst incentives (Li and Hwang (2008)) or scaling issues (Cen, Wei and Zheng (2007)) find mixed or even contradictory results. The controversy surrounding the interpretation of analyst forecast dispersion compels a need for alternative empirical measures of differences of opinion.

In this chapter, I introduce a new measure of difference of opinion using the portfolio holdings of active mutual fund managers. First, I estimate a mutual fund manager's belief of a stock's expected returns as the difference between the fund portfolio weight and the benchmark weight. Black and Litterman (1992) show that a fund portfolio can be constructed as a full position in the benchmark plus a zero-cost long-short portfolio made up of the deviations from a benchmark.[23] Hence, portfolio stock weights reveal the implied beliefs of the expected returns of these stocks. Mutual fund manager disagreement

[23] A number of recent studies have used this approach to study the performance of mutual funds. Cremers and Petajisto (2009) find that funds that actively deviate from their benchmarks outperform and exhibit strong performance persistence. Shumway, Szefler and Yuan (2009) show that mutual fund managers with correct beliefs persistently outperform. Cohen, Polk and Silli (2009) use this methodology to isolate the best picks of each manager and find that portfolio of 'best ideas' generates excess returns. Jiang, Verbeek and Wang (2011) find that stocks with the largest average tilt outperform stocks with low average tilts.

(MFD) is then calculated as the standard deviation in portfolio tilts scaled by the absolute value of the average tilt in a stock.

Using this measure of differences of opinion, I analyze the role of disagreement amongst mutual fund managers in predicting the cross section of future stock returns. The evidence rejects the over-valuation hypothesis. In particular, a portfolio of stocks in the highest quintile of MFD outperforms stocks in the lowest quintile of MFD by 0.64% over the subsequent quarter after adjustments for size, book-to-market and momentum. The outperformance exhibits marginal significance under certain specifications. While the initial findings do not support the over-valuation hypothesis, the statistical evidence finds some support for the information uncertainty hypothesis. The results are found primarily in small cap, low book-to-market stocks which are stocks that are likely to have more information uncertainty. Interestingly, the portfolios returns are persistent and exhibit return continuation for up to a year (2.4%) after portfolio formation.

An alternative interpretation of these findings is that the MFD measure captures valuable information possessed by mutual fund managers. Mutual fund holdings have been shown to predict future returns (Grinblatt and Titman (1993), Chen, Jegadeesh, and Wermers (2000), Chen, Hong and Stein (2002)) and in particular large positions have been shown to be especially profitable (Busse, Green and Baks (2007), Cohen, Polk, and Silli (2009)). To address the latter concern that large positions may skew the distribution of MFD, I truncate overweight tilts at twice the benchmark portfolio weight. This creates an equal upper and lower bound for the MFD distribution. I control for these mutual fund based information measures in Fama-MacBeth cross regressions. The results are robust to both of these controls which suggest that it is unlikely that MFD proxies for information.

This chapter contributes to an interesting and developing area of research that studies heterogeneous beliefs amongst investors by introducing a novel and intuitive

measure for differences of opinion. The MFD measure offers several attractive features over existing proxies of differences of opinion. First, mutual funds are an interesting venue to study and analyze differences of opinion. Fund managers are professional investors with access to large resources whose livelihoods are to make portfolio allocation decisions. Fund managers typically have a considerable amount of experience and expertise in asset management. Second, clear performance metrics are used to judge fund performance. Not only are managers benchmarked to widely reported indices, but they are also judged on the fund's tracking error to ensure that funds are operating under their specified mandates. Third, mutual fund managers are compensated on the accuracy of their beliefs. Good performance attracts fund flows which raises the assets under management. In contrast, sell-side analysts may have other career incentives that bias their forecast projections. For example, analysts may appease corporate management in an effort to maintain investment banking relations within the company.[24]

The evidence in this chapter is most closely related to Cragg and Malkiel (1980). They collect proprietary expectations estimates from seventeen buy-side investment companies during the 1960s. They find that the variance of expectations is positively related to future returns and interpret this to be consistent with a risk explanation. I confirm their results in a later sample using a larger pool of investment managers. An additional benefit of this study is the public availability of mutual fund holdings which allows for further extensions and avenues for future research.

This chapter develops as follows. Section 2 explains the methodology used to elicit mutual fund manager beliefs. Section 3 reports descriptive statistics and compares the

[24] Cohen, Frazzini and Malloy (2010) find that sell-side analysts that were subsequently appointed to company positions would issue over-optimistic forecasts of the companies they covered.

MFD measure against previous measures of differences of opinion. Section 4 presents the main results. Section 5 concludes.

3.2 METHODOLOGY

3.2.1 Eliciting Manager Beliefs

There are a number of methodologies for solving for the optimal portfolio that incorporate views and opinions that deviate from benchmark portfolio (Black and Litterman (1992), MacKinlay (1995), Brennan and Xia (2001)). Given the holdings of a portfolio, we can reverse engineer the views and opinions of a mutual fund manager assuming that managers hold optimal portfolios. For example, Shumway, Szefler and Yuan (2009) use the Black-Litterman model to elicit the views of fund managers to identify fund outperformance. That methodology specifically takes into account the return covariance matrix of all stocks in the benchmark. Cohen, Polk and Silli (2009) adopt the framework derived in MacKinlay (1995) to identify the 'best idea' from a manager's holdings.

To formalize how the beliefs of a fund manager can be extracted from portfolio holdings, I sketch below the Black-Litterman framework. The Black-Litterman model starts with assumption that the benchmark portfolio represents equilibrium returns. The equilibrium returns of the benchmark portfolio can be expressed as:

$$\Pi = \lambda \Sigma \omega_{benchmark}$$

Π is the $N \times 1$ vector of implied equilibrium excess returns, λ is the risk aversion coefficient, Σ is the $N \times N$ covariance matrix of excess returns and $\omega_{benchmark}$ is the $N \times 1$ weight of the assets in the benchmark. Managers may have their own views of excess returns that are different from the implied equilibrium excess returns of the benchmark. Substituting in the manager's views, μ_m, the manager chooses portfolio weights to

maximize the expected return over the benchmark while minimizing the tracking error. Assuming quadratic utility, the manager solves the unconstrained maximization problem where q represents his weight:

$$\max_{q} = (q-\omega)'\mu_m - \lambda(q-\omega)'\sum(q-\omega)/2$$

$$(q-\omega) = (\lambda\Sigma)^{-1}\mu_m$$

$$\mu_m = \lambda^{1}\Sigma(q \quad \omega)$$

The manager's beliefs, μ_m, can be expressed as a function of the manager-specific risk aversion, λ^{-1}, covariance matrix of excess returns, Σ, and his deviations from the benchmark $(q-\omega)$. For empirical tractability, we make the simplifying assumption that risk aversion is constant across managers, and Σ is a diagonal matrix that represents each stocks residual variance. Then, a manager's belief on a stock can be approximated by:

$$\mu_m \approx \sigma^2 (q-\omega)$$

In this version, I make the decision to estimate a manager's belief as the deviation from the benchmark. This is a reasonable approximation since the aggregation of beliefs will be at the stock level and stock's residual variance, σ^2, is constant for each stock. For each fund portfolio f, I approximate each manager's belief, μ_m, with the measure *Tilt* defined as the weight of a stock relative to the benchmark index.

For each stock i, at time t:

$$Tilt_{f,i,t} = q^{Portfolio}_{f,i,t} - \omega^{Benchmark\ Index}_{f,i,t}$$

$$q^{Portfolio}_{f,i,t} = \begin{cases} \omega^{Portfolio}_{f,i,t} & if \quad \omega^{Portfolio}_{f,i,t} \le 2 \quad \omega^{Benchmark}_{f,i,t} \\ 2\times\omega^{Benchmark}_{f,i,t} & if \quad \omega^{Portfolio}_{f,i,t} > 2 \quad \omega^{Benchmark}_{f,i,t} \end{cases}$$

where $\omega^{Portfolio}_{f,i,t}$ is weight of stock i in fund f and $\omega^{Benchmark\ Index}_{f,i,t}$ is the corresponding weight in the fund's benchmark index. Portfolio weights that are greater than twice the benchmark are capped at twice the Benchmark Index weight for two reasons. First, Cohen, Polk and Silli (2009) find that the single largest overweight position of active mutual funds

outperforms the market.[25] Capping an overweight position at twice the benchmark weight insures that the measure does not simply capture their previously documented effect. Second, this truncation ensures that the measure is not driven by extreme outliers.

Each fund's benchmark index is selected using the Active Share methodology in Cremers and Petajisto (2009) discussed in the next section. A stock that is in a benchmark index but not owned in the portfolio receives a *Tilt* equal to exactly negative the benchmark weight.[26] A stock that is owned by a fund but is not a constituent member of the benchmark receives a *Tilt* equal to its portfolio weight.

Next, I construct a measure of differences of opinion using the previously defined *Tilt* measure. Mutual fund manager disagreement, MFD, is defined as the standard deviation of *Tilt* at the end of each quarter *t,* for each stock *i,* scaled by the absolute value of the average *Tilt*:

$$MFD_{i,t} = standard\ deviation(Tilt_{f,i,t}) \,/\, \left|mean(Tilt_{f,i,t})\right|$$

$$= \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(Tilt - \overline{Tilt})^2} \,/\, \left|mean(Tilt_{f,i,t})\right|$$

I introduce two alternative measures of mutual fund manager disagreement that address potential pitfalls of the measure construction. The first measure, MFD_{Zero}, eliminates zero holding positions and incorporates only positive holding positions. This measure alleviates the concern that non-holding positions may strongly influence the results. The second measure, MFD_{VW}, uses an alternative measure of Tilt based on the CRSP value-weighted index instead of the Active Share matched benchmarks.

[25] Cohen, Polk, and Silli (2009) isolate the single largest overweight positions from every active mutual fund from 1991 to 2005. They find that the top 25% of these positions outperform by 1 to 4% per quarter.

[26] Since mutual funds are typically prohibited from short selling, this effectively creates a floor on the negative tilt of the stock (Almazan, Brown, Carlson and Chapman (2004)).

3.2.2 Data Selection

The sample selection closely follows Cremers and Petajisto (2009). I focus on all-equity funds following the screening procedure used in Cremers and Petajisto (2009).[27] This procedure excludes bond funds, balanced and asset allocation funds, international funds, precious metals and sector funds. I further limit the sample to only actively managed index funds by dropping index or closet index funds. There are a total of 2355 active funds in my sample. The sample period starts from the first quarter 1990 and ends in the last quarter of 2006.

Cremers and Petajisto (2009) use a total of 19 benchmarks from three index fund families (S&P, Russell and Wilshire). In this analysis, I use 17 benchmarks. The benchmarks include: S&P 500, S&P 500 Growth, S&P 500 Value, S&P400, S&P600 Russell 1000, Russell 2000, Russell 3000 and Russell Midcap including the value and growth components of each. I omit the Wilshire 5000 and Wilshire 4500 indices due to the large number of stocks in each index. The large number of stocks in these benchmarks implies small weights for each index constituent which could bias the construction of the measure of manager dispersion. This issue is also a concern for the other index benchmarks. Managers do not typically hold all the stocks in the benchmark index due the high transactions costs of maintaining those positions. The results are not significantly different if the bottom 10% of smallest stocks within each benchmark is omitted.

A fund's benchmark is selected by computing the lowest Active Share with respect to all the benchmarks following Cremers and Petajisto (2009). This approach matches the portfolio holdings of the mutual fund to the closest index benchmark during a given

[27] The screening procedure requires a fund to meet the following criteria: A fund must have a Wiesenberg objective code of growth, growth and income, equity income, growth with current income, maximum capital gains, small capitalization growth or missing. Next, the funds must also have an ICDI fund objective code of aggressive growth, growth and income, income, long-term growth, or missing. Finally, a fund must have a Spectrum investment objective code of aggressive growth, growth, growth and income, unclassified or missing.

quarter. This methodology is preferred to a return-matching regression methodology because it can be estimated each quarter, when daily mutual fund returns may be unavailable and eliminates the possibility of matching to an unlikely benchmark. The data for fund benchmarks is obtained directly from Petajisto's website.[28]

The data on stock holdings are from the CDA/Spectrum mutual funds holdings database by Thomson Financial. To remain conservative, I do not carry forward holdings for quarters where mutual funds do not report. The stocks are matched to CRSP. The data on stock returns and trading volume are from CRSP. The sample is limited to common stocks in the United States with share codes 10 or 11. To avoid microstructure effects and limited mutual fund ownership, the sample only includes stocks with market capitalizations above the 20% NYSE decile and greater than $5 as of the previous quarter end. Using the previous quarter as a cutoff insures against potential selection issues. To be included in the sample, the stock must appear in a benchmark index and must have a holding position by at least two mutual fund managers to estimate the dispersion measure.

I construct the following stock characteristic variables as controls. Mktcap is the logarithm of the market capitalization at the end of quarter t. B/M is the logarithm of the book-to-market ratio at the end of quarter t. The book-to-market ratio is industry adjusted following Wermers (2004). Turnover is the share turnover standardized by the average stock turnover of the firm's exchange (NYSE/AMEX or NASDAQ). Risk adjustment is performed using DGTW characteristic portfolio returns following Daniel, Grinblatt, Titman and Wermers (1997) and Wermers (2004).[29]

[28] http://www.petajisto.net/data.html

[29] The DGTW benchmarks are available via
http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm

I construct two popular measures of differences of opinion for comparison with the MFD measure.[30] Analyst dispersion is calculated as the standard deviation of analyst forecasts scaled by the absolute value of the average forecast following Diether, Malloy and Scherbina (2002). An alternative measure for analyst dispersion is calculated scaling by price following Garfinkel (2009). Second, Garfinkel (2009) proposes that quarterly unexplained turnover can proxy for differences of opinion. DTO, the unexplained change in turnover, is calculated as the difference between the current quarter turnover and the turnover of the trailing six months.

There is substantial evidence that mutual funds possess valuable information. Various studies have documented that mutual fund holdings predict positive future excess returns.[31] To insure that the MFD measure is capturing disagreement and not information, I calculate three of the most prominent holdings based measures to control for potential information effects.

1. **MFOwn.** This measure is calculated as the fraction of shares held by mutual funds for each stock following Chen, Jegadeesh, and Wermers (2000).
2. **Δ Breadth.** Chen, Hong and Stein (2002) count the number of mutual funds that hold a position in a stock scaled by total number of mutual funds. For each stock, the breadth measure is the quarterly change in the number of mutual funds with a position in the stock.

3.3 DESCRIPTIVE STATISTICS

Table 3.1 presents the descriptive statistics of the sample. The sample is composed of larger stocks compared to the full CRSP stock universe. This reflects the fact that

[30] Goetzmann and Massa (2005)

[31] These studies include: Grinblatt and Titman (1989, 1992), Hendricks, Patel, and Zeckhauser (1993), Grinblatt, Titman and Wermers (1995), Kacperczyk, Sialm, and Zheng (2005, 2008)

stocks in benchmark indices tend to be larger stocks. Additionally, I exclude stocks priced below $5 and stocks smaller than the 2nd NYSE decile as of the previous quarter end. To calculate the disagreement measure, a stock must have more than one mutual fund position to be included in the sample.

Table 3.2 presents correlation tables of the key variables used in the study. The top diagonal represents rank-order Spearman correlations while the bottom diagonal represents Pearson correlations. Since the unit value of the MFD measure is a relative measure amongst stocks and lacks meaningful economic interpretation, the Spearman correlations may reveal more about how it is related to other key variables. The correlation table is separated into three panels. Panel A presents correlations with other difference of opinion measures. The MFD measure has low correlations with other measures of difference of opinion. It is negatively correlated with analyst dispersion (Spearman rank correlation = -0.07) and positively correlated with turnover (Spearman rank correlation = 0.11). Panel B presents correlations with measures of information. MFD tends to more highly correlated with level measures (Breadth and MFOwn) than with change measures. Overall, the correlations are relatively low with these information proxies with the highest Spearman rank correlation of 0.30 with Breadth. Panel C presents correlations with stock characteristics. Since the overall correlations with stock characteristics are relatively low, I sort stocks into MFD quintiles to observe stocks characteristics within each quintile.

Table 3.3 presents average stock characteristics across each MFD quintile. To construct the MFD quintiles, stocks are first assigned into five size groups based on market capitalization at the end of the previous quarter. Then, within each size quintile, stocks are dependently sorted into five additional groups based on MFD. This sorting procedure is adapted from Chen, Hong and Stein (2002). This procedure is performed to address the concern that MFD has greater variation across large stocks. A simple unconditional

sorting on MFD unconditional on size would create quintiles where the extreme portfolios would be predominantly large stocks.

Stocks in the high MFD quintile have lower book-to-market ratios and higher turnover and unexplained turnover (DTO) than stocks in the low MFD quintile. This is consistent with the intuition that disagreement is related to turnover and disagreement is likely to occur when information uncertainty is high as is the case with low book-to-market stocks. Consistent with earlier correlation results, analyst dispersion is lower amongst high MFD stocks. Mutual fund information measures are positively associated with MFD quintiles.

Figure 3.1 plots the values of MFD in the two quarters preceding and after portfolio sorting. MFD values in the extreme quintiles are higher during the quarter of portfolio formation but it shows that stocks tend to exhibit persistent MFD. This suggests that MFD tends to be a firm level characteristic that reflects an underlying disagreement surround the stock.

3.4 RESULTS

This section presents the main tests of the various theories that predict a relation between differences of opinion and future stock returns. The goal is to determine whether MFD contains information about future stock returns. First, I use Fama and MacBeth (1973) cross-sectional regressions to draw conclusions about MFD and future returns. The regressions include controls for firm characteristics and information proxies to help distinguish the effect of mutual fund manager disagreement (MFD). Next, stocks are assigned into portfolios based on firm characteristics to deliver insights on which types of stocks the MFD effect is most prominent. Finally, I perform a thorough analysis of the timing of portfolio returns for both short and longer horizons.

3.4.1 Regression Analysis

I estimate a series of Fama and MacBeth (1973) cross-sectional regressions to illustrate the relation between mutual fund manager disagreement (MFD) and future stock returns. The regressions are estimated each quarter and the coefficient estimate are averaged over time. I include lagged values of market capitalization, book-to-market ratio, turnover and momentum (past 6 month returns). The standard errors are adjusted following Newey-West with up to 8 lags.

Table 3.4 presents the results of these regressions using various specifications. Columns [1]-[3] present estimates of MFD, MFD_{zeros}, and MFD_{vw} and firm characteristics on stock returns over the next quarter. MFD is a significant valuation indicator while MFD_{zeros} is marginally significantly related to returns over the next quarter. MFD_{vw} is not significantly related to future returns which indicates that identifying accurate fund benchmarks is important to calculating the differences in opinion measure.

Next I test whether MFD predicts future returns in excess of existing measures of differences of opinion. I estimate two sets of results for equal weighted and valued weighted regressions. Value weighted regressions are estimated by weighting the regression by market capitalization. Columns [4]-[5] present the equal weighted results with analyst dispersion and unexpected turnover (DTO). The coefficient estimates for analyst dispersion are negative and statistically significant which is consistent with the findings in Diether, Malloy and Scherbina (2002). The inclusion of these differences of opinion measures renders the effect of MFD marginally significant. Columns [6]-[7] present the value weighted results with the inclusion of analyst dispersion and unexpected turnover (DTO). Value weighting produces an interesting effect in that MFD is positive and statistically significant. Unexpected turnover (DTO) is also statistically significant in this specification. On the other hand, analyst dispersion is statistically insignificant in the

value-weighted regression specification. The weaker significance of value-weighting on analyst dispersion is consistent with the findings in Diether, Malloy and Scherbina (2002) which documents that the effect of analyst dispersion is primarily in smaller stocks.

These initial results warrant further discussion. For all specifications, the findings are inconsistent with over-valuation theory of Miller (1977) that predicts that differences of opinion are negatively related to future returns. The results though are not strongly significant across all specification although the coefficient estimate for MFD is consistently positive. The regressions do not overturn the empirically negative relationship between analyst dispersion and future returns rather it brings to question whether analyst dispersion proxies for differences of opinion in light of MFD coefficient estimate. A remaining concern is that mutual fund manager disagreement measure MFD may also be a poor measure for differences of opinion as it may capture information effects from mutual fund holding positions documented in the previous literature.

The results reported in **Table 3.4** panel B casts doubt on the interpretation of mutual fund manager disagreement as a proxy for information. Specifically, the findings indicate that the inclusion of mutual fund information proxies do not significantly alter the effect of MFD on future returns. The coefficient estimates on MFD remain positive and statistically significant. These results suggest that the mutual fund manager disagreement MFD can be interpreted as a measure for differences in opinion amongst investors.

3.4.2 Sorting by Firm Characteristics

To identify how MFD operates as a valuation indicator, I analyze which types of stocks the MFD effect is the strongest. I create portfolios formed using dependant sorts based on stock characteristics and MFD to observe average future returns. The stock characteristics are market capitalization, book-to-market ratio and past 6 months return.

These characteristics are reliably shown to capture the cross section of stock returns (Fama and French (1992), Jegadeesh and Titman (1993)).

Table 3.5 presents the results of equal weighted average portfolio returns using dependent sorts based on stock characteristics and MFD. Each quarter, stocks are sorted into 3 bins based their characteristic (market capitalization, industry-adjusted book-to-market ratio, and past 6 month stock return). Within each bin, stocks are further sorted into 3 bins based on their MFD measure. The stocks are held for the following year and the cumulative raw returns are reported.[32] The t-statistics are adjusted using Newey-West correction with up to 8 lags.

The results in the left panel of **Table 3.5** indicate that the ability of the MFD measure to forecast future stock returns is found primarily in smaller stocks. Within the smallest stocks quintile of the sample, the high MFD stocks outperform low MFD stocks by 1.75% annually although the differences are marginally significant. The high-low MFD spread is smaller for mid-cap and large-cap stocks. The middle panel of **Table 3.5** reports the results of sorts based on the book-to-market ratio. High MFD stocks outperform low MFD stocks only amongst low B/M stocks. The right panel of **Table 3.5** reports sorts based on past 6 month returns and MFD. The high-low MFD spread is increasing in past stock returns but is statistically insignificant.

These finding reveal interesting insights into the source of MFD as a valuation indicator. Closer inspection shows that the MFD return effect is primarily found in small, glamour stocks which are different than the analyst dispersion effect which is concentrated in smaller distressed stocks (Avramov, Chordia, Jostova, and Philipov (2009)). Low MFD stocks tend to have particularly poor performance relative to other stocks in the same size and book-to-market groups. Interestingly, low MFD stocks are unlikely to be stocks that

[32] The results are similar using 3, 6, and 9 month horizons.

mutual funds avoid. Rather the characteristics of low MFD stocks in **Table 3.3** indicate that mutual funds tend to be overweight low MFD stocks.

Figure 3.2 presents a time-series plot of a long-short trading strategy that trades long the top MFD portfolio and shorts the bottom portfolio over the sample period. The portfolios are held for 3 months and reformed at the end of each quarter. The figure reports annualized returns. The results show that the strategy is particularly profitable particularly during the dot-com bust when small glamour stocks performed poorly.

3.4.3 Timing of Returns

The information uncertainty hypothesis predicts that stocks with larger differences of opinion should have higher expected returns to compensate for risk. Since MFD is highly persistent, these models should predict return continuation if the fundamental risks of the stock do not change. In this section, I explore the timing of future returns using portfolio sorts.

Table 3.6 presents the future six month DGTW risk-adjusted returns on five portfolios sorted on MFD for equal-weighted (Panel A) and value-weighted portfolios (Panel B). The return differential between high- and low-MFD stocks increases every month for the subsequent six months for both equal and value weighted portfolios. The return spread is statistically significant for holding periods of three months or longer. The return continuation persists even after six months and lasts as long as one year. **Figure 3.3** plots the DGTW returns of high- and low-MFD portfolios for a year out. Panel A reports equal-weighted portfolios, panel B reports value-weighted portfolios and panel C presents an equal-weighted portfolio using the alternative MFD_{zeros} measure. In all three panels, the high MFD portfolio outperforms the low MFD portfolio over the next full year.

3.5 CONCLUSION

This chapter addresses the debate surrounding the importance of heterogeneous beliefs on asset prices by introducing a new measure of differences of opinion based on mutual fund manager beliefs. Recent theories examine the role of differences of opinion on asset prices but offer different cross-sectional predictions. The new measure constructed in this chapter attempts to shed light on this debate.

The results indicate that stocks with higher mutual fund manager disagreement (MFD) earn higher future returns than low MFD stocks. I find that this return continuation persists up to a year. This result rejects the over-valuation hypothesis of Miller (1977) and is at odds with alternative measures of differences of opinion such as dispersion in analyst's forecasts. Instead, I interpret the evidence presented in this chapter to be in-line with information uncertainty theories.

Figure 3.1: Mutual Fund Manager Disagreement Around Portfolio Formation

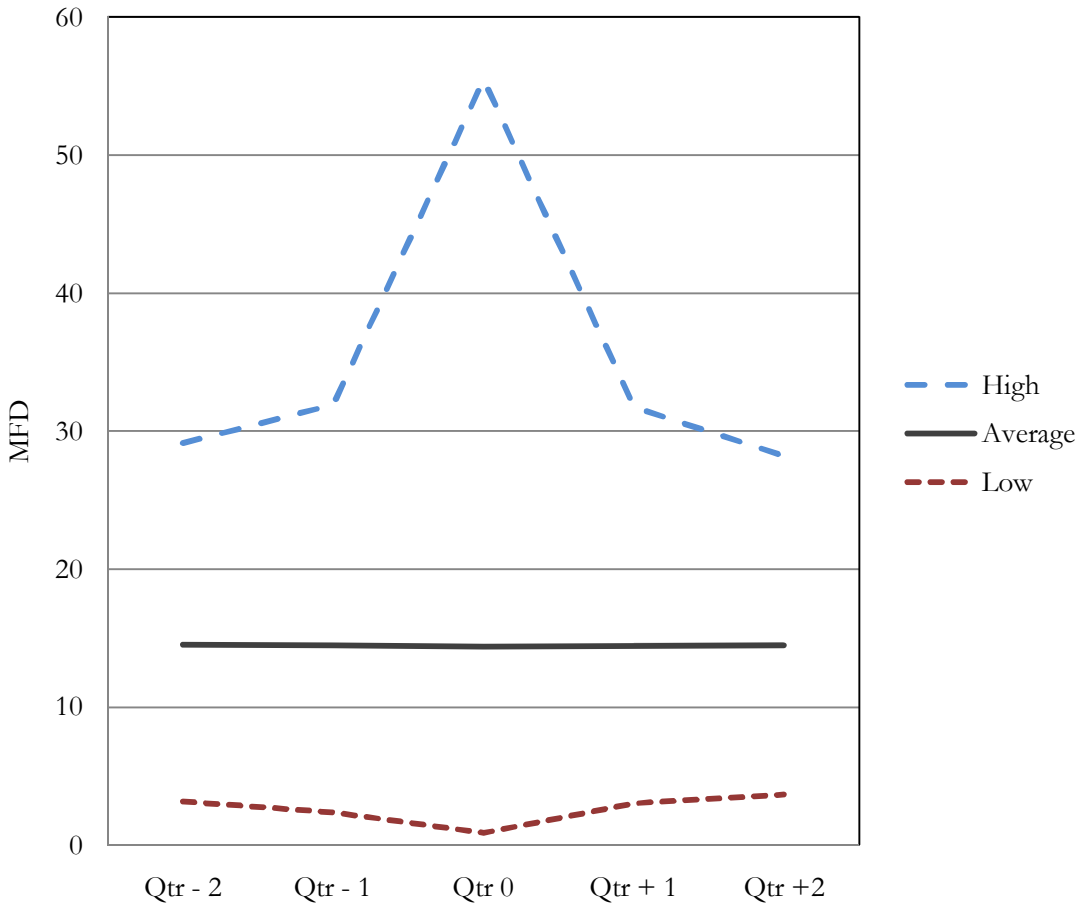

Figure 3.2: Time Series of Long-Short Portfolio of Mutual Fund Manager Dispersion (MFD) from 1990 -2006

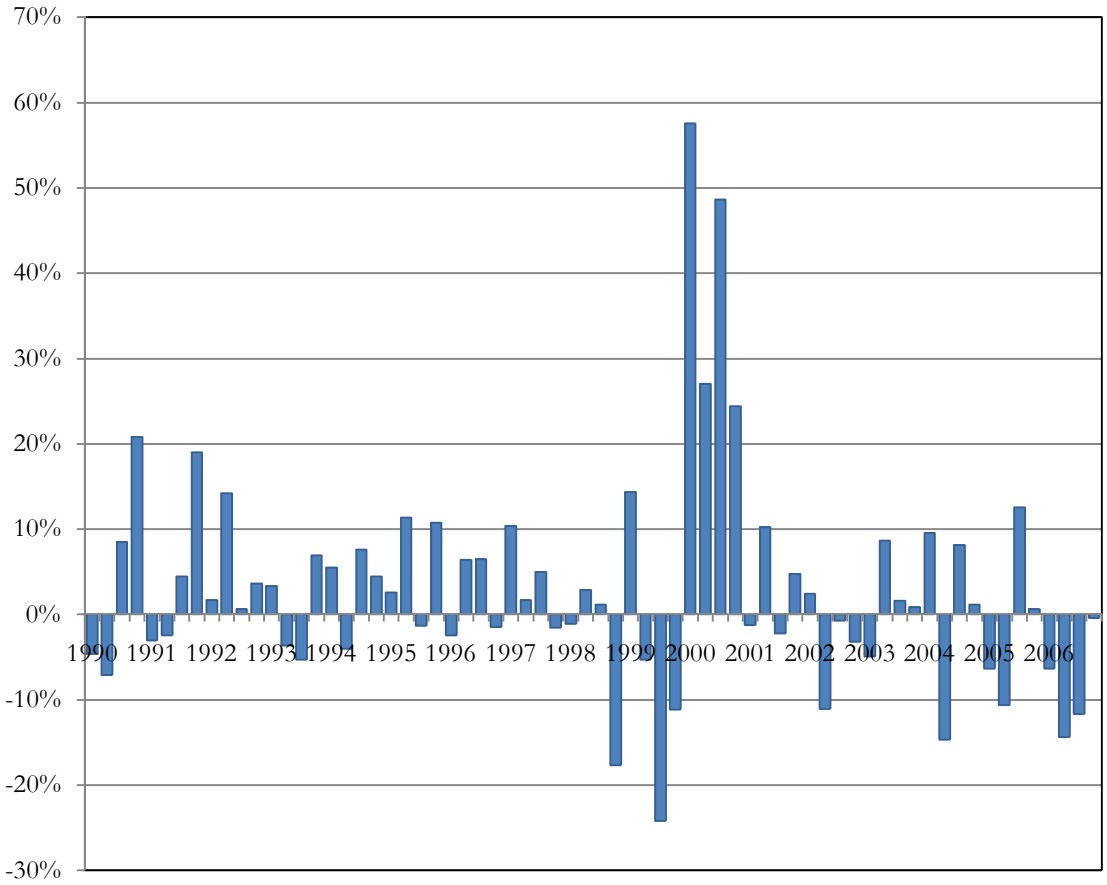

Figure 3.3A: Cumulative Abnormal (DGTW) Adjusted Returns from Portfolio Formation - Panel A. Equal Weighted Portfolios formed on MFD

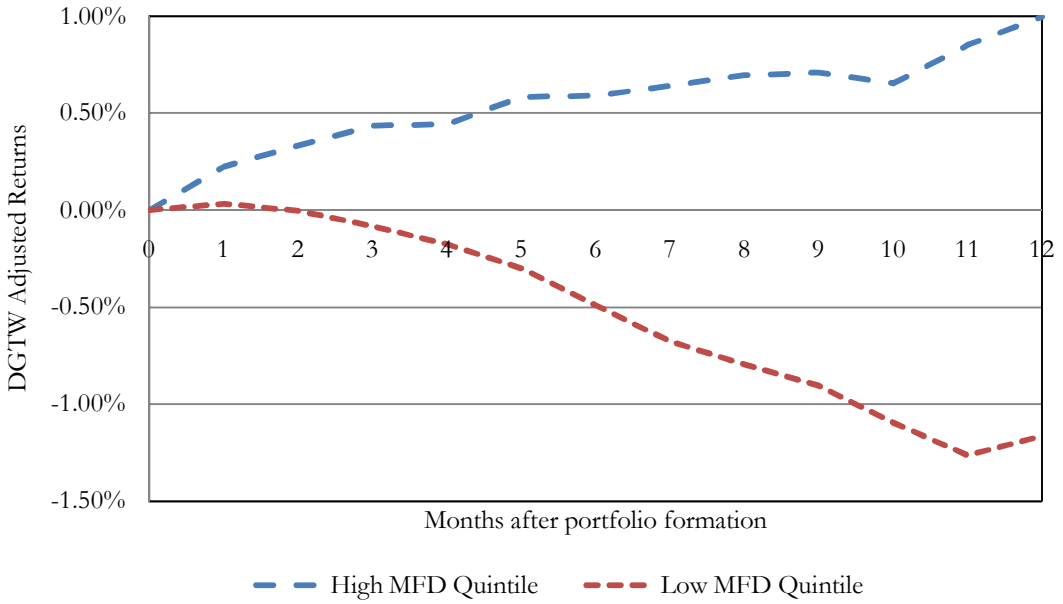

Figure 3.3B: Panel B. Valued-Weighted Portfolios formed on MFD

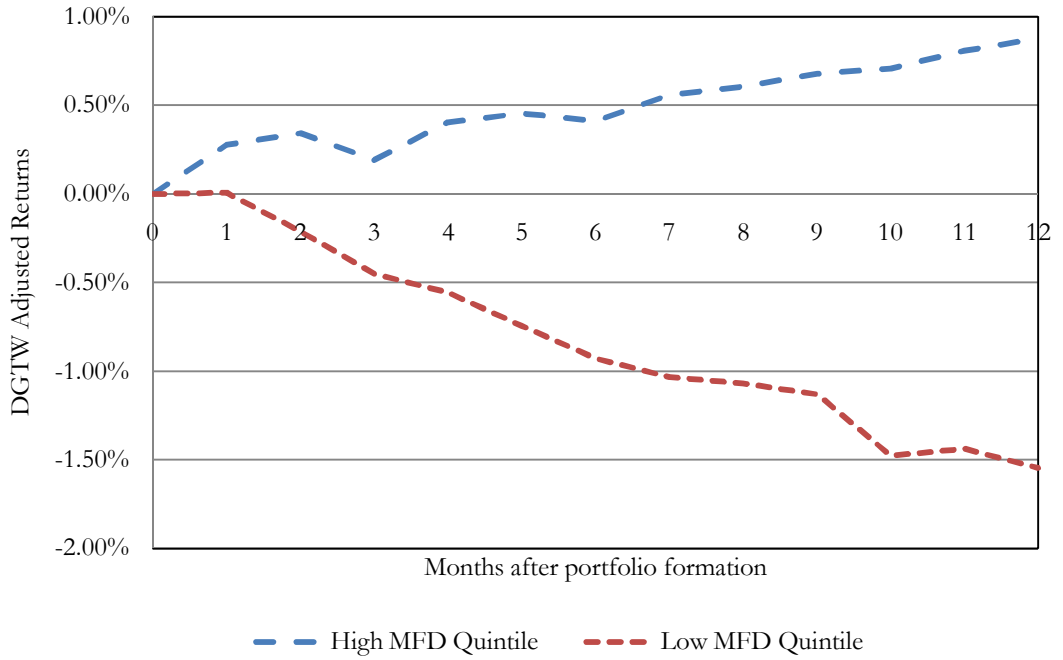

Figure 3.3C: Panel C. Equal Weighted Portfolios Formed on MFDZero

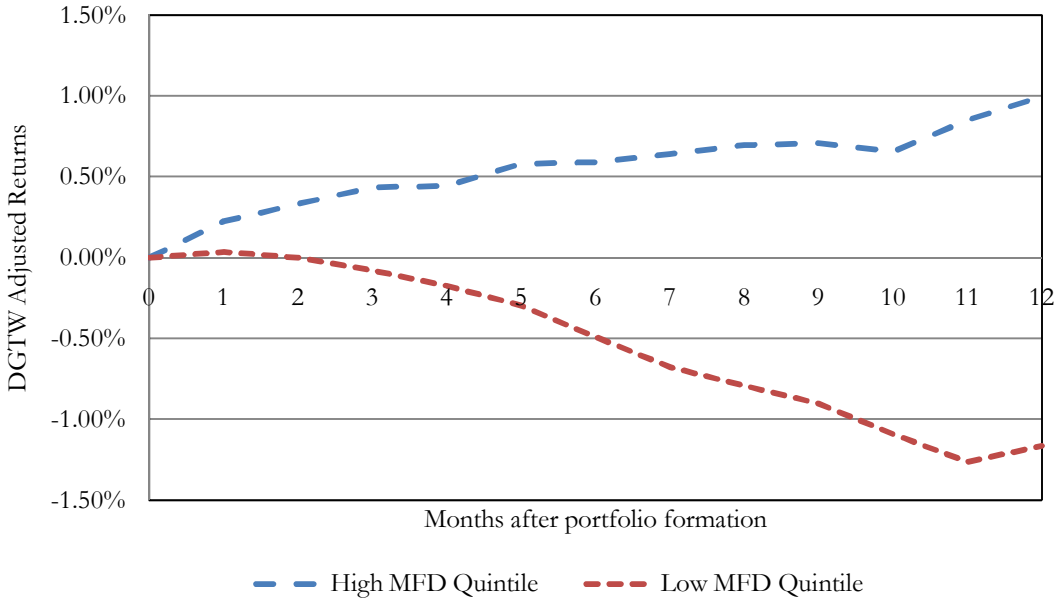

Table 3.1: Sample Statistics

Description: The sample includes common stocks from the CRSP database that are listed on the NYSE, AMEX and NASDAQ with a market capitalization above the 20th NYSE breakpoint and with a price greater than $5 at the end of the prior quarter. To be included in the sample, the stock must be owned by more than 1 mutual fund. The data for mutual funding holdings is from Thomson and includes only active mutual funds following the screening procedure described in Cremers and Petajesto (2009). The # of mutual funds, # of Stocks and average market capitalization are tallied at the end of each year.

Year	# of Mutual Funds	# of Stocks	Average Market Capitalization
1990	290	1542	1785
1991	339	1820	2041
1992	396	2002	2049
1993	402	2136	2182
1994	495	2286	2032
1995	520	2503	2511
1996	756	2779	2825
1997	691	2706	3780
1998	791	2677	4723
1999	1033	2790	5934
2000	957	2946	5213
2001	919	2350	5664
2002	1068	2143	4840
2003	1125	2216	6222
2004	1293	2031	7340
2005	1178	2188	7451
2006	1232	2120	8781

Table 3.2A: Correlation Table

Description: This table presents correlations of the key variables used in this paper. The top diagonal reports Pearson correlations and the bottom diagonal reports Spearman correlations. *Panel A* presents correlations across differences of opinion proxies. *Panel B* presents correlations across information proxies. *Panel C* presents correlations across firm characteristics. MFD is the mutual fund manager disagreement measured as the standard deviation of each manager's stock tilt scaled by the absolute value of the average tilt where tilt is defined as the managers' deviation from their benchmark index, adjusted for large overweights (see text). Analyst Dispersion is the dispersion of analysts forecasts scaled by the absolute value of the average forecast following Diether, Malloy, Scherbina (2002). Analyst dispersion (P) is the dispersion of analysts forecasts scaled by price following Garfinkel (2009). TURN (Q/M) is the turnover of the stock over the past quarter/month. DTO is the quarterly unexplained turnover calculated following Garkinkel (2009). GT is average portfolio weight across all mutual funds for each stock calculated following Grinblatt and Titman (1993). Breadth is the total number of mutual funds that hold a position in the stock as a percentage of the total number of mutual funds at the time. Δ Breadth is the change in the number of mutual funds holding the stock scaled by the number of mutual funds holding the stock at q-1. MFOwn is the total % share ownership by all active mutual funds. Trade is the change in MFOwn from quarter t-1 to t. B/M is the industry adjusted book to market ratio as defined in Wermers (2004). MktCap is the total market capitalization. MOM is the past 6 month stock return. % Funds Overweight is the number of funds overweight the stock divided by the number of funds who have the stock in their benchmark.

Panel A. Difference of Opinion Proxies

	MFD	Analyst Disp	Analyst Disp (P)	TURN (Q)	TURN (M)	DTO
Mean	14.49	0.11	0.01	0.32	0.11	0.00
STD	38.61	0.29	0.56	0.35	0.12	0.08
N	157,176	110,410	110,417	98,828	98,828	98,799
MFD	1	-0.07	-0.08	0.11	0.11	0.02
Analyst Disp	-0.01	1	0.87	0.16	0.16	-0.01
Analyst Disp (P)	0.00	0.02	1	0.06	0.06	0.00
TURN (Q)	0.02	0.09	0.01	1	0.95	0.00
TURN (M)	0.01	0.09	0.01	0.91	1	0.20
DTO	0.00	0.00	0.01	0.13	0.45	1

Table 3.2B: Correlation Table Continued

Panel B. Mutual Fund Information Proxies

	MFD	Breadth	Δ Breadth	MFOwn	Trade
Mean	14.49	0.04	0.00	0.08	0.00
STD	38.61	0.04	0.01	0.07	0.04
N	157,176	157,176	155,249	157,176	155,249
MFD	1	0.30	0.05	0.28	0.05
Breadth	0.03	1	0.14	0.56	0.07
Δ Breadth	0.01	0.10	1	0.11	0.41
FracOwn	0.07	0.25	0.10	1	0.28
Trade	0.01	0.03	0.33	0.31	1

Panel C. Stock Characteristics

	MFD	BM	Mktcap	MOM	TURN	%Funds Overweight
Mean	14.49	0.58	4287.12	1.10	4.38	0.92
STD	38.61	0.48	15815.98	0.40	7.11	0.11
N	157,176	118,867	157,176	157,131	157,176	157,176
MFD	1	-0.06	0.07	0.02	0.07	-0.05
BM	-0.02	1	-0.16	0.07	-0.30	0.05
Mktcap	0.00	-0.09	1	0.14	0.07	-0.30
MOM	0.00	0.04	0.01	1	0.02	0.01
TURN	0.00	-0.15	-0.02	0.08	1	-0.05
% Fund Overweight	0.04	0.02	-0.26	0.03	0.04	1

Table 3.3: Characteristics of Stocks Sorted on Mutual Fund Manager Disagreement

Description: This table reports the average stock characteristics of mutual fund manager disagreement (MFD) quintiles. The quintiles are formed each quarter from 1990 to 2006 by ranking stocks based on MFD relative to other stocks in their size quintile from the previous quarter. MFD is the mutual fund manager disagreement measured as the standard deviation of each manager's stock tilt scaled by the absolute value of the average tilt where tilt is defined as the managers' deviation from their benchmark index, adjusted for large overweights (see text). MktCap is the logarithm of the market capitalization at the end of quarter t. B/M is the logarithm of the book-to-market ratio at the end of quarter t. MOM is the past 6 month stock return. TURN is the quarterly share turnover standardized by the average stock turnover of the firm's exchange (NYSE/AMEX or NASDAQ). DTO is the quarterly unexplained turnover calculated following Garkinkel (2009). Analyst disp is the standard deviation of analysts forecasts scaled by the absolute value of the average forecast calculated following Diether, Malloy and Scherbina (2002). # of Funds Hold is the number of mutual funds holding the stock at t. Δ Breadth is the change in the breadth of mutual fund ownership for a stock from quarter t-1 to t. % Funds Overweight is the # of funds that hold overweight positions divided by the total number of funds in which is the stock is in their benchmark.

	MFD	MktCap	B/M	MOM	TURN	DTO	Analyst Disp	# Funds Hold	ΔBreadth	MF Own	% Funds O-weight
Mean	14.4	4198	0.59	1.10	32%	-0.01%	0.11	29.3	0.03%	8.0%	0.2639
MFD Quintile											
Low	0.9	3420	0.61	1.10	28%	-0.41%	0.13	15.7	-0.05%	5.1%	0.5827
2	2.2	3894	0.62	1.10	32%	-0.01%	0.12	27.6	0.00%	7.3%	0.2274
3	4.4	4604	0.58	1.10	34%	0.12%	0.11	33.9	0.07%	9.0%	0.1826
4	9.0	4643	0.57	1.11	34%	0.17%	0.10	35.0	0.08%	9.4%	0.1702
High	55.4	4432	0.57	1.10	33%	0.08%	0.11	34.1	0.05%	9.0%	0.1565

Table 3.4A: Fama-MacBeth Regressions of Future Quarterly Return on MFD

Description: This table presents coefficient estimates of quarterly Fama-MacBeth cross sectional regressions of future quarterly return on mutual fund manager disagreement (MFD). MFD is the mutual fund manager disagreement measured as the standard deviation of each manager's stock tilt scaled by the absolute value of the average tilt where tilt is defined as the managers' deviation from their benchmark index, adjusted for large overweights (see text). B/M is the industry adjusted book to market ratio as defined in Wermers (2004). MktCap is the total market capitalization. MOM is the past 6 month stock return. The t-statistics (in parenthesis) are reported in parenthesis and are adjusted using the Newey-West estimator with up to 8 lags.

Panel A. Difference of Opinion Proxies

	Dependant Variable: Cumulative Raw Return over next 1 Quarter						
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
MFD	0.001**			0.001*	0.000*	0.002**	0.001**
	(2.29)			(1.99)	(1.7)	(2.12)	(2.31)
MFD_{zeros}		0.073*					
		(1.73)					
MFD_{vw}			-0.001				
			(-0.65)				
Disagreement Proxy							
Analyst Disp				-0.414**		-0.819	
				(-2.19)		(-1.63)	
DTO					-4.650		-2.954***
					(-1.2)		(-2.97)
Firm Characteristics							
Mktcap	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000
	(-0.36)	(-0.57)	(-0.34)	(-0.13)	(-0.2)	(0.2)	(-0.07)
B/M	0.597*	0.592*	0.602*	0.542	0.578	0.430	0.386
	(1.74)	(1.73)	(1.76)	(1.61)	(1.67)	(0.95)	(0.87)
TURN	-0.010	-0.012	-0.010	-0.011	-0.011	0.095	0.126
	(-0.14)	(-0.16)	(-0.13)	(-0.14)	(-0.16)	(0.85)	(1.31)
RET (t-1)	-4.313*	-4.316*	-4.316*	-3.819	-4.404*	-2.868	-3.549
	(-1.7)	(-1.7)	(-1.7)	(-1.36)	(-1.72)	(-0.97)	(-1.22)
MOM6	1.268	1.274	1.271	1.502	1.508*	0.849	1.383*
	(1.36)	(1.36)	(1.36)	(1.38)	(1.7)	(1.21)	(1.94)
Intercept	6.985*	6.905*	6.997*	6.040	6.793*	5.472	6.231*
	(1.99)	(1.98)	(1.99)	(1.55)	(1.98)	(1.58)	(1.89)
Weighting:	*None*	*None*	*None*	*None*	*None*	*Mktcap*	*Mktcap*
Average Adjusted R-Square	0.065***	0.059***	0.059***	0.073***	0.070***	0.128***	0.132***
	(5.12)	(5.48)	(5.42)	(5.6)	(5.51)	(6.83)	(7.11)

Table 3.4B: Fama-MacBeth Regressions of Future Quarterly Return on MFD

Description: This table presents coefficient estimates of quarterly Fama-MacBeth cross sectional regressions of future quarterly return on mutual fund manager disagreement (MFD). MFD is the mutual fund manager disagreement measured as the standard deviation of each manager's stock tilt scaled by the absolute value of the average tilt where tilt is defined as the managers' deviation from their benchmark index, adjusted for large overweights (see text). B/M is the industry adjusted book to market ratio as defined in Wermers (2004). MktCap is the total market capitalization. MOM is the past 6 month stock return. The t-statistics (in parenthesis) are reported in parenthesis and are adjusted using the Newey-West estimator with up to 8 lags.

Panel B. Information Proxies

Dependant Variable: Cumulative Raw Return over next 1 Quarter		
	[1]	[2]
MFD	0.001**	0.001**
	(2.36)	(2.47)
Information Proxies		
Mown	0.908	0.671
	(0.46)	(0.27)
Breadth		0.244**
		(2.26)
Firm Characteristics		
Mktcap	-0.000	-0.000
	(-0.45)	(-0.28)
B/M	0.664**	0.667**
	(2.00)	(2.01)
TURN	-0.022	-0.026
	(-0.3)	(-0.36)
RET (t-1)	-4.642*	-4.901*
	(-1.82)	(-1.94)
MOM6	1.151	0.965
	(1.23)	(1.05)
Intercept	7.409**	7.907**
	(2.08)	(2.27)
Adjusted R-Square	0.067***	0.068***
	(5.25)	(5.27)

Table 3.5: Portfolio Returns Sorted by Firm Characteristics and Mutual Fund Manager Disagreement

Description: This table reports future annual average portfolio returns of stocks sorted into groups based on stock characteristics and mutual fund manager disagreement (MFD). At the end of each quarter, stocks are first ranked into three characteristics groups based on either market capitalization, book-to-market or momentum (past six months return). Within each characteristic group, stocks are sorted into three additional groups based on their MFD. An equal weighted porfolio is formed and held over the following 12 months. MFD is the mutual fund manager disagreement measured as the standard deviation of each manager's stock tilt scaled by the absolute value of the average tilt where tilt is defined as the managers' deviation from their benchmark index, adjusted for large overweights (see text). The t-statistics are reported in parenthesis and are adjusted using the Newey-West estimator with up to 8 lags.

Mean Returns									
	Market Capitalization			*Book-to-Market*			*Momentum*		
MFD	*Small Cap*	*Mid Cap*	*Large Cap*	*Low BM*	*Medium BM*	*High BM*	*Loser*	*Medium*	*Winner*
Low	13.74%	13.76%	14.14%	10.83%	14.95%	17.50%	11.64%	14.62%	16.27%
Medium	15.44%	14.86%	13.95%	13.33%	15.09%	17.47%	13.14%	14.50%	16.17%
High	15.50%	15.02%	14.44%	13.66%	15.34%	16.70%	12.32%	14.86%	17.48%
High-Low	1.75%	1.26%	0.31%	2.83%	0.40%	-0.80%	0.69%	0.24%	1.22%
t-statistic	(1.72)*	(1.27)	(0.31)	(2.31)**	(0.42)	(-1.16)	(0.75)	(0.33)	(1.32)

Table 3.6: Portfolio Returns Sorted on Mutual Fund Manager Disagreement

Description: This table reports future average portfolio returns of mutual fund manager disagreement (MFD) quintiles. At the end of each quarter, stocks are ranked into quintiles based on their MFD relative to stock in their previous quarter size quintile. An equal weighted porfolio is formed and held over the following 6 months. Panel A presents equal-weighted portfolios of DGTW (1997) characteristics adjusted returns. Panel B presents value-weighted portfolios of DGTW (1997) characteristics adjusted returns. MFD is the mutual fund manager disagreement measured as the standard deviation of each manager's stock tilt scaled by the absolute value of the average tilt where tilt is defined as the managers' deviation from their benchmark index, adjusted for large overweights (see text). The t-statistics are reported in parenthesis and are adjusted using the Newey-West estimator with up to 8 lags.

Panel A: Equal Weighted Cumulative DGTW Adjusted Returns

	m+1	*m+2*	*m+3*	*m+4*	*m+5*	*m+6*
Low MFD	0.0003	0.0000	-0.0008	-0.0018	-0.0030	-0.0049
	0.16	-0.01	-0.32	-0.58	-0.94	-1.46
2	0.0013	0.0031	0.0021	0.0025	0.0030	0.0026
	0.81	1.75	1.02	1.00	1.15	0.96
3	0.0009	0.0026	0.0018	0.0021	0.0024	0.0035
	0.55	1.69	1.02	1.20	1.21	1.71
4	0.0014	0.0036	0.0048	0.0053	0.0055	0.0056
	1.43	2.12	2.63	1.78	1.58	1.39
High MFD	0.0022	0.0033	0.0044	0.0044	0.0058	0.0059
	2.26	2.59	2.93	2.20	2.65	2.05
Portfolio 5- 1	0.0019	0.0033	0.0052	0.0062	0.0088	0.0108
	1.18	1.66	2.31	1.95	2.33	2.61

Panel B: Value Weighted Cumulative DGTW Adjusted Returns

	m+1	*m+2*	*m+3*	*m+4*	*m+5*	*m+6*
Low MFD	0.0001	-0.0021	-0.0045	-0.0056	-0.0074	-0.0093
	0.05	-1.04	-2.00	-2.39	-3.18	-3.64
2	0.0003	0.0004	0.0005	0.0014	0.0008	0.0018
	0.30	0.19	0.26	0.48	0.20	0.46
3	-0.0005	0.0001	-0.0006	-0.0001	-0.0004	-0.0012
	-0.39	0.09	-0.27	-0.06	-0.28	-0.56
4	0.0016	0.0033	0.0036	0.0028	0.0031	0.0026
	0.99	1.29	1.30	0.84	0.84	0.65
High MFD	0.0028	0.0034	0.0019	0.0040	0.0045	0.0041
	2.38	2.84	1.16	1.77	1.88	1.44
Portfolio 5- 1	0.0027	0.0055	0.0064	0.0096	0.0120	0.0134
	1.50	1.91	2.00	2.71	3.00	3.46

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